ILENR/RE-GI-90/12

ILLINOIS LAND REPORT SALEM TOWNSHIP OF KNOX COUNTY

Final

June 24, 1990

Illinois Department of Energy and Natural Resources

Illinois Lands Unsuitable for Mining Program

James R Thompson, Governor
Karen Witter, Director

Printed by the authority of the State of Illinois

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**ILLINOIS LAND REPORT :
SALEM** TOWNSHIP OF KNOX
COUNTY : FINAL ; JUNE 24,
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ENR

Illinois Department of Energy and Natural Resources

325 W. Adams Street, Room 300
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Karen A. Witter, Director

To Interested Agencies, Public Groups and Citizens:

The Illinois Department of Energy and Natural Resources (ENR) would like to announce the final ILLINOIS LAND REPORT: SALEM TOWNSHIP OF KNOX COUNTY. The preparation of the Land Report is required by the Illinois Surface Coal Mining Land Conservation and Reclamation Act, which establishes a process whereby interested parties may petition the State of Illinois through the Department of Mines and Minerals (DMM) to designate lands as unsuitable for all or certain types of coal mining operations. ENR is then required by the Act to prepare a Land Report with respect to each petition filed and declared complete by DMM.

The Land Report contains available information that has been compiled regarding the Salem Township petition area and surrounding region. By Illinois Statute, the Land Report must not contain a recommendation with respect to the final decision: the final decision is made by DMM. In reaching its decision, DMM will use the Land Report, as well as, other relevant information provided by interested agencies, public groups and citizens.

The Land Report contains a comprehensive statement on the existing resources of the area, the supply and demand for coal, and the impacts of mining on existing land use plans or programs, fragile or historic lands, renewable resource lands, the human environment, socioeconomic resources and natural hazard lands. In addition, the Report addresses all the allegations presented in the petition. A Map Atlas is also provided to be used concurrently with the Report.

We wish to thank those who read the draft Land Report and submitted comments: many of these comments have been incorporated into the final edition. Persons who submitted comments to ENR during the comment period will receive a written response from the Department. Correspondence from commentors and ENR's responses are on file at ENR and will be submitted to DMM.

While some interested parties may not have been able to respond to the draft Land Report issued May 1, 1990, they may still submit comments on the final Land Report to DMM up to three days before the public hearing date. The public hearing will be held on August 14, 1990 beginning at 9:00 AM. DMM has reserved the theater at Carl Sandburg College in Galesburg, Illinois. Interested parties may give testimony at the public hearing regarding the final Land Report.

Sincerely,

Karen A. Witter

Karen A. Witter
Director

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ILLINOIS LAND REPORT
SALEM TOWNSHIP
OF KNOX COUNTY

FINAL

JUNE 1990

Illinois Department of Energy and Natural Resources
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NOTE

This report has been reviewed by the Illinois Department of Energy and Natural Resources (ENR) and approved for publication. Additional copies of this report are available by calling the ENR Clearinghouse at 800/252-8955 (within Illinois) or 217/785-2800 (outside Illinois).

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PREFACE

This final Land Report has been prepared by the Illinois Department of Energy and Natural Resources. Each Division within the Department prepared segments of this Report. Individual authors from the Illinois State Geological Survey (ISGS), the Illinois State Water Survey (ISWS), the Illinois State Natural History Survey (INHS), the Illinois State Museum (ISM), and the Office of Research and Planning (ORP) are listed below by chapter. Additionally, contributors who offered assistance and support in various capacities are listed.

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CHAPTER I.

INTRODUCTION

A. THE PETITION PROCESS

The Illinois Surface Coal Mining Land Conservation and Reclamation Act (the Act) (PA 81-1015; Illinois Revised Statutes, ch. 96 1/2, par. 7901.01 et seq.) establishes a process whereby interested parties may petition the State of Illinois through the Illinois Department of Mines and Minerals (DMM) to designate lands unsuitable for all or certain types of coal mining operations. The Illinois Department of Energy and Natural Resources (ENR) is required by the Act to prepare a Land Report for each petition filed and declared complete by DMM.

Criteria for assessing the unsuitability of lands are provided in Section 7.02 of the Act. The section states that lands shall be designated as unsuitable if reclamation is determined by DMM to be technologically and economically unfeasible in accordance with the requirements of the Act. Lands may also be (but are not required to be) designated as unsuitable if mining operations will:

- be incompatible with existing state or local land use plans or programs; or

- affect fragile or historic lands in which such operations could result in significant damage to important historic, cultural, scientific or aesthetic values or natural systems; or

- affect renewable resource lands in which such operations could result in a substantial loss or reduction of long-range productivity of water supply or of food or fiber products; or

- o affect natural hazard lands in which such operations could substantially endanger life and property, such lands to include areas subject to frequent flooding and areas of unstable geology.

Land Reports prepared by ENR must evaluate whether mining operations, on the land which is the subject of the petition, would have any or all of the effects described above. In addition a Land Report must contain a detailed statement on the potential resources of the area, the demand for coal resources and the impact of a designation of such lands as unsuitable for mining on the environment, the economy and the supply of coal.

In preparing this Land Report, ENR is required to consider "objectively the information which the Department of Energy has but shall not contain a recommendation with respect to whether the petition should be granted or denied" (Il. Rev. Stat. ch. 96 1/2, par. 7907.04, 1987). Based on this information, the Land Report will address allegations found in the petition. Further, the Land Report will document the quality and quantity of existing resources in the petition area and surrounding region. It also examines how these resources might change in the future under two conditions: 1) mining does not occur, or 2) mining does occur in the petition area.

DMM must make a final decision on the Salem Township of Knox County, Illinois petition no later than one year after the date the petition was determined complete. The decision will be based on the findings presented in this report, information provided by other governmental agencies, and relevant information submitted during the comment period.

DMM has regulatory responsibility to:

- o designate the petitioned land areas as unsuitable for surface coal mining in whole or in part; or

- o not to designate the petitioned land areas as unsuitable; or

- o to place conditions on future surface mining operations in all or part of the petitioned area which would successfully mitigate the impacts of such operations.

A decision not to designate the petitioned land areas as unsuitable does not mean that coal mining necessarily will occur. By state law, surface coal mining may not commence until specific mining and reclamation plans are approved and a permit has been issued by DMM.

B. DATES OF PETITION SUBMISSION AND SCHEDULED DECISION

The Salem Township of Knox County, Illinois petition to have certain farmlands, Tama, Ipava and Sable soils designated as unsuitable for surface coal mining, was determined by DMM to be complete on October 24, 1989. (See Appendix A for a copy of petition). The final Land Report is to be completed not later than eight months after receipt by ENR of a request from DMM (62 Ill. Adm. Code 1764.15(c)(2). A public hearing on the petition shall be held no later than August 24, 1990, ten months from the date that DMM determined the petition complete. The final Land Report on the petition area must be available to the public no later than 1 month prior to the public hearing.

Within 60 days after the public hearing, DMM is required to make a final decision regarding whether the Salem Township of Knox County, Illinois petition area should be deemed unsuitable for surface coal mining (in whole or in-part). The final decision must be made no later than October 24, 1990.

C. DESCRIPTION OF THE PETITION UNDER CONSIDERATION

The Petitioners and Petition Area

The petition requesting DMM to designate certain farmlands, Tama, Ipava and Sable soils, Knox County, Illinois as unsuitable for surface coal mining operations, was submitted by Sharon Terrell, Egbert Threw, and the Knox County Farm Bureau, Inc., on their own behalf and on behalf of the Knox County Farm Bureau members.

The petition area designating certain farmlands as unsuitable for surface mining is located in east-central Illinois, Knox County, Salem Township, T-9-N, R-4-E, (Map 1). Farmlands in question are included in sections 13, 14, 15, 16, 21 (N 1/2, SE 1/4), 22, 23, 27, 28 (NE 1/4), 34, and 35 (Map 2). Land parcels within the petition area are privately owned residences and farmlands, and land owned by Peabody Coal Company.

Several coal mining permits have been issued by DMM to Midland Coal Company within the last five years. These border the petition area to the east in Peoria County (permits 1 and 64 Elm Mine), and to the southwest (permits 6, 65, 126, 132, 170, 212 - Rapatee Mine). The cities of Galesburg in Knox County, Peoria in Peoria County, and Canton in Fulton County encircle the petition area. Other smaller

communities surround the petition area proper including Elmwood to the northeast in Peoria County, Farmington directly south in Fulton County, and Yates City due north in Knox County (Map 3).

Basic Petition Allegations

Basic petition allegations are primarily concerned with four issues: the affects of surface coal mining on certain soils identified in the petition, the affects of surface coal mining on water resources, the affects of surface coal mining on historic property, and the affects of surface coal mining on the tax base and property values. Accordingly, the petitioners seek a designation of unsuitability under the following provisions of the Act and its regulations which protect certain lands from surface coal mining operations when:

- Certain lands cannot be reclaimed in accordance with the requirements of the Act.

  30 USC 1265 (b) (2)

  30 CFR 810.2 (c)

  Il. Rev. Stat. ch. 96 1/2, par. 7903.03

- Operations would result in loss and/or reduction of an historic property.

  30 USC 1272 (a) (3) (B)

  30 CFR 762.11 (b) (2)

- Operations could result in loss and/or reduction of long-range productivity of water supplies including damage to aquifers and aquifer recharge areas of land now supporting agricultural activity.

30 USC 1272 (a) (3) (C)

30 CFR 762.11 (b) (3)

Il. Rev. Stat. ch. 96 1/2, par. 7901.02, 7903.10 (f)

- o Operations would result in loss and/or reduction of consistent long-range productivity of supplies of food and fiber.

30 USC 1272 (a) (3) (C)

30 CFR 762.11 (b) (3)

Il. Rev. Stat. ch. 96 1/2, par. 7901.02

- o Operations would deprive the petitioners and other Knox County taxpayers of their Constitutional rights of fairness in the taxation process.

30 USC 1202 (a)

30 CFR 810.2 (a)

Il. Rev. Stat. ch. 96 1/2, par. 7901.02

In addition to these provisions which specifically relate to the State Act and regulations, the petitioners list other more specific allegations with respect to mining the area in question. Table I-1 lists the specific claims found in the petition: this report will address all the petition allegations.

D. ILLINOIS SURFACE COAL MINING LAND CONSERVATION AND RECLAMATION ACT

The Illinois Surface Coal Mining Land Conservation and Reclamation Act (PA81-1015) was enacted September 22, 1979. DMM promulgated rules and regulations for the Act in September 1980. The law was passed in Illinois in response to the Federal Surface Mining Control and Reclamation Act of 1977 (PL 95-87), which requires such a state law in order for a state to assume primacy in

implementation and enforcement. The State Act and regulations are very similar to the Federal law and regulations, primarily because the Department of Interior, Office of Surface Mining required a parallel legislation on the state and Federal level in order for the state to qualify for primacy.

The process for designating lands unsuitable for mining is only one of several elements of the Act. The Act additionally provides for reclamation of abandoned mine lands, sets performance standards for surface and underground mining (including reclamation standards), and defines those conditions under which mining is prohibited. The legislative declaration of the Act (Section 1.02) states that "It is declared to be the policy of this State to provide for conservation and reclamation of lands affected by surface and underground coal mining in order to restore them to optimum future productive use and to provide for their return to productive use......"

TABLE I-1

PETITION ALLEGATIONS

A. Allegations Related to Impacts on Existing Land Use Plans or Programs

- o Surface mining operations would be incompatible with existing land use plans, among them: Knox County Soil Erosion and Sediment Control Plan (P.L. 99-1998, PA 132, Food Security Act of 1985, Sec. 540 (e) (4) (11),Sec. 540.24 (d)); Illinois Water Quality Management Plan (35 Ill. Adm. Code Part 351); and Illinois State Groundwater Protection Act of 1987-(Il. Rev. Stat., ch. 111 1/2, par. 1001-1052).

B. Allegations Related to Impacts on Fragile or Historic Lands*

- o Tama, Sable and Ipava soils are among the finest soils in Illinois. The ability to restore the physical and chemical characteristics of the soils and overburden identified in the petition to their capability prior to mining has not been demonstrated.

- o Sharon Terrell is the owner of historic land and an historic structure which is eligible for listing on the State or National Register of Historic Places. The structure, in the path of the expansion of surface mining, would be adversely effected by the expansion.

- o There could be potential damage to the structure from blasting at a nearby surface mine.

- o Potential adverse effects to this historic property would be damage to a tribute to the cultural and esthetic values of Salem Township.

C. Allegations Related to Impacts on Renewable Resource Lands*

- o Continuing to mine Tama, Sable and Ipava soils will adversely affect renewable resource lands on which mining will result in a substantial loss and reduction of long-range productivity of food production.

- o No reclamation of Tama, Sable and Ipava soils has met the criteria for long-term, "intensive", "within a reasonable time", return to equivalent yield (productivity) under equivalent levels of management.

- o Mining operations could result in a substantial loss or reduction of long-range productivity of water on renewable resource lands.

- o Surface coal mining the prime soils specific to the area identified would irreparably harm the hydrologic balance and diminish water quality and quantity of the affected and adjacent area.

- o Surface mining operations would adversely affect the quality and quantity of the petitioner's water flows causing damage to essential hydrologic function.

- Substantial loss or reduction of the long-range productivity of the aquifers and recharge areas that supply properties in the petition area.

- Petitioner Terrell is dependent upon the well on her property as a domestic water supply. If surface mining operations are permitted, there will be a potential interruption in petitioner Terrell's water supply.

D. Allegations Related to Impacts on the Human Environment

- Burning the high sulfur coal found on the petition site would adversely affect health and the human environment.

- Surface mining operations and the resultant heavy coal hauling traffic past Sharon Terrell's place, will substantially endanger her and her family, denying them their rights to a safe and healthful environment under Article VI of the Constitution of Illinois.

- The historic structure in question is open to the public for house tours on a periodic basis. Visitors to a house tour who park their vehicles along the roadway are subject to the danger of swiftly passing coal truck traffic.

E. Allegations Related to Impacts on Socioeconomic Resources

- The difference between economic value of farm operations before mining, and economic value of farm operations after mining of Tama, Sable and Ipava soils reclaimed under the "highest standard of reclamation" to reclaimed soil Rapatee 872B is diminished income.

- The benefits farmers' obtain from USDA programs on reclaimed soil Rapatee 872B, are less than benefits on unmined Tama, Sable and Ipava soils.

- Surface mining of Tama, Sable and Ipava soils reclaimed to the "highest standard of reclamation" Rapatee 872B, do not maintain the Knox County property tax base at premining level.

- Surface mining of Tama, Sable and Ipava soils reclaimed to the "highest standard of reclamation" Rapatee 872B, results in 1/2 the tax assessment valuation of unmined Tama, Sable and Ipava soils.

- Surface mining of Tama, Sable and Ipava soils reclaimed to the "highest standard of reclamation" Rapatee 872B, results in 1/2 the real estate appraisal value of unmined Tama, Sable and Ipava soils.

- The impacts of coal hauling traffic would overwhelm usage of Knox County Highway #22, causing a breakdown and deterioration of the road serving farmers.

F. Allegations Related to Impacts on Natural Hazard Lands*

- None

* As indicated in the rules and regulations pertinent to the Illinois Surface Coal Mining Land Conservation and Reclamation Act, the following are definitions for fragile, historic renewable resource and natural hazard lands.

Fragile lands means geographic areas containing important natural, ecologic, scientific or esthetic resources that could be significantly damaged or destroyed by surface coal mining operations. Examples of fragile lands include valuable habitats for fish or wildlife, critical habitats for endangered or threatened species of animals or plants, uncommon geologic formations, National Natural Landmark sites, areas where mining may cause flooding, environmental corridors containing a concentration of ecologic and esthetic features, areas of recreational value due to high environmental quality, and buffer zones adjacent to the boundaries of areas where surface coal mining operations are prohibited under Section 522 (e) of the Act and Part 1761 of these regulations.

Historic lands means important historic or cultural districts, places, structures or objects, including archaeological and paleontological sites, National Historic Landmark sites, sites listed on a State or National Register of Historic Places, sites having religious or cultural significance to native Americans or religious groups, or sites for which historic designation is pending.

Renewable resource lands means aquifers and areas for the recharge of aquifers and other underground waters, areas for agricultural or silvicultural production of food and fiber and grazing lands.

Natural hazard lands means geographic areas in which natural conditions exist which pose or, as a result of surface coal mining operations, may pose a threat to the health, safety or welfare of people, property or the environment, including areas subject to landslides, cave-ins, large or encroaching sand dunes, severe wind or soil erosion, frequent flooding, avalanches and areas of unstable geology.

CHAPTER II

DESCRIPTION OF THE PETITION AREA

A. INTRODUCTION

The following chapters (II-X) provide an indepth discussion of the resources in the petition area and the surrounding vicinity. Topics include geological resources (chpt. III), atmospheric resources (chpt. IV), water resources (chpt. V), soil resources (chpt. VI), biological resources (chpt. VII), cultural resources (chpt. VIII), socioeconomic resources (chpt. IX), and coal resources - supply and demand (chpt. X). Chapter XI will address the impacts of mining on the petition area. This chapter will first report on the quality of the databases used for each chapter and secondly, place the petition area in its regional context.

B. QUALITY OF THE DATABASE

The Illinois State Geographic Information System Database

The Illinois State Geographic Information System (GIS) database was developed in response to Section 522 of the Federal Surface Mining Control and Reclamation Act of 1977. Section 522 of the Act calls for designating Areas Unsuitable for Surface Coal Mining as one approach for controlling the potential impacts of mining. Each state was requested to establish a process for making objective decisions, based on scientifically sound data and information regarding the selection of land areas which are unsuitable for mining.

Pursuant to Federal legislation, Illinois enacted The Surface Coal Mining Land Conservation and Reclamation Act in June of 1980. An interagency agreement between the Department of Energy and Natural Resources and the Illinois Department of Mines and Minerals was signed in 1982, whereby ENR would become

responsible for preparing the database and inventory system required for petition processing, land report development and distribution. A statewide GIS was developed for Illinois which includes a comprehensive set of geographically located natural resource, environmental, infrastructure, socioeconomic and cultural data, to assist in evaluating petition areas. Subsequent to this initial phase databases have been updated and new ones created. Some of the research in the following chapters, and many of the maps in the Atlas are derived from ENR's GIS statewide databases.

Geologic Data

Geological resources have been characterized with a very large and high-quality database provided in large part by Mid State Coal Company. These include over 1,200 borings located on very large scale (1 inch = 100 feet) maps. Of these, lithologic logs for over 500 borings were utilized to map the Quaternary deposits, shallow sand and gravel aquifers, depth to bedrock, bedrock topography, overburden on each of the Herrin and Springfield Coal Members, the thickness of each of the coals, and to draw cross sections of the petition area. These data constitute a much greater data resource than typically available for the characterization of such a small area.

The GIS provided a means for organizing, managing, and producing maps from the large volume of data received from Mid State Coal Company. Without the relational database, computer contouring, and map composition capabilities of the GIS, the geologic and coal resource maps for this report would have been (1) impossible to produce in the allotted time and (2) of lesser quality than the present products.

Locations of the coal borings digitized into the GIS from Mid State's large-scale maps should be very precise. Elevations for each boring were surveyed by Mid State. Lithologic descriptions of the borings give coal depths and thicknesses and depth to the top of bedrock very precisely. However, because they are not core borings, they probably are less precise in the identification of lithologic variation in both the drift and bedrock overburden. Thin bedrock and drift units may not have been identified in the records. This should have no influence on the conclusions of this report.

Other data provided in map form by Mid State include coal structure, crop lines, and mined out areas. These were at a scale of 1 inch = 100 feet or 1 inch = 1,000 feet. Both provide information at a scale suitable for the analyses done in this report.

Other well data were retrieved from the GIS files of the State Geological Survey and State Water Survey. Well data utilized for this report comprise all of the data from both agencies' files. Although records of water wells drilled in Illinois are supposed to be filed with these agencies, experience has shown that most areas contain wells for which no records have been filed with the state. Location information for water wells is typically imprecise, being given to the nearest 160 or 40 (occasionally 10) acres.

To better characterize the geological resources of the petition area, the analyses presented herein have considered all data from within the petition area and the 36 square miles area including it. This allows better identification of trends in thickness, elevation, and properties of geologic units. In the area, detailed field notes on file at the ISGS contain descriptions of bedrock outcrops, coal thicknesses, and drift stratigraphy. These were especially useful in mapping bedrock topography and coal structure.

Automated maps of regional coal resources were taken from GIS files for analysis of the significance of the petition area coal resource. These data are examined for a nine county area taken from the statewide GIS database.

Mined-out-area maps for this report were compiled from Mid State and from other mining companies at a variety of scales and have mixed accuracies. Most other maps are based on considerable data as specified above. This includes studies by Wanless (1957) and others who have thoroughly characterized the bedrock succession in the vicinity of the petition area.

In summary, the database is exceptionally detailed and useful for the characterization of geologic resources in the petition area and vicinity. It was taken from a substantial GIS database and supplemented by petition area specific data.

<u>Air Quality and Hydrologic Data</u>

The current and continued air quality monitoring program in Knox, Peoria, and Tazewell counties played an important role in the air quality portion of the report. The climate portion of the report used the excellent historical climate data available for the area and real-time data available from the Midwestern Climate Center.

The hydrologic data used to prepare this report are very good. The analysis of the data was greatly enhanced by the ability to use the Department of Energy and Natural Resources' GIS in the preparation of this report. The GIS made it possible in some cases, and much easier in others, to gather and interpret the engineering data in a spatial form.

The water quality work on the neighboring Court Creek watershed in Knox County helped significantly in determining the potential impact that mining would have in the Farmington area. New water quality data within the petition area were collected and included in this report.

The hydrographic data used in preparing this report have been selected and developed with great confidence in their quality. Several GIS products or digital maps at a scale of 1:24,000 were developed especially for use in the analysis of the petition area. Detailed features of watersheds, floodplains, land use/land cover, contours, water bodies, wetlands, potential reservoirs, and streams, with their engineering-related GIS attributes, were created at a resolution of 1:24,000 and used for the writing of this report. The United States Geological Survey's current and long-term water resources data for the area under study were also used. Additional field measurements were made for the streams in and around the petition area.

The overall adequacy of the data used in compiling the groundwater portions of this report is judged as fair. Hydrologic records within and surrounding the petition site provide a good assessment of the types of wells which are used and which may be affected by surface-mining practices. The number of homes located on the topographical maps of the area shows that there are probably many domestic water wells in and around this area for which there are no records. However, the available records provided good information pertaining to the geology and general groundwater use for the groundwater portions of this report. Because specific information concerning the groundwater flow is not available on a site-specific basis without field experiments, general groundwater principles were used to estimate flow and possible degradation due to mining.

Soil Data

A published, modern soil survey is available for Knox County. The overall quality of these data are good, although the minimum resolution of one soils polygon is about 2.5 acres. Because of the relative uniformity of the soils in the petition area (over 76 % of the area in just three soil types), a higher resolution soils map would probably not have altered data presented in this report.

A one-section buffer around the petition site itself was selected to consider if soils within the petition area were representative of the surrounding region. Five sections of the 36-section buffer extended into Fulton County for which there is no modern soil survey available, so the buffer was actually a 31-section area in Knox and Peoria Counties (advance copy from the recently completed Peoria County survey was available).

The petition and buffer soils data were automated into the GIS. Registration accuracy was good when combining the soils data with other information in the GIS. For example, merging of soils and land cover files allowed for quantification of soil types used for agriculture. The GIS files also facilitated the grouping of soils by certain characteristics and the ability to display the results in map form. As an example, the capability of soils to be reclaimed after mining, based on aggregation of 14 soils characteristics, was mapped for the report (Map 85).

Approximately 22 percent of the petition area is Lenzburg soils, created by mining activities that pre-date current reclamation laws. Data pertaining to suitable uses of the Lenzburg series is sometimes lacking in soil survey tables. Especially important

for studying this area was crop productivity ratings for the soils. The Knox County Soil Survey had no data on the productivity indices of Lenzburg, but the information was collected from personal communications with soil scientists and from a 1988 U.S. Department of Agriculture Soil Conservation Service publication on important farmlands of Illinois.

Information specific to the issues of reclamation of prime farmland and high capability soils in western Illinois was somewhat limited in the literature. Considerably more studies have been done in southern Illinois and Kentucky, but their applicability to the soil types of western Illinois is subject to interpretation.

Biological Data

Because of the small size and secretive habits of many mammals, no body of observational records exists comparable to that available for birds or fishes. The Illinois Department of Conservation (IDOC) produces annual reports on the harvests of game animals and fur bearers within the state. These records, however, are compiled by multi-county wildlife management units and are not site-specific. Museum specimens from a variety of sources (e.g. scientific surveys, road-kills) provide site-specific distributional information on all types of mammals; some areas within the state, however, appear to be underrepresented in museum collections. All Illinois specimens in collections are listed in Hoffmeister (1989). Additional records, including published accounts and unpublished data collected by IDOC and Illinois Natural History Survey (INHS) personnel, are included in the Illinois Fish and Wildlife Information System (IFWIS; INHS). Recent records (since 1982) of threatened and endangered mammals are also contained in the Illinois Natural Heritage Database (INHD; Division of Natural Heritage, IDOC).

There has been no systematic survey of the mammals within the petition area and there are very few specimens from Knox County (Hoffmeister 1989). Anderson (1951) described the mammals of adjacent Fulton County, and bat surveys were conducted at Rice Lake in Fulton County by the INHS in 1983 and the IDOC in 1987 (IFWIS). Specimens of many species have been collected in Fulton and Peoria counties (Hoffmeister 1989).

A large body of distributional data for bird species in Illinois is contained in three state-managed databases. The IFWIS database contains over 15 years of seasonal observation records that have been submitted to the IDOC by professional and amateur birders from around the state. Most of these data are specific only to the county level and this database has a tendency to under-represent the more common bird species. The Illinois Breeding Bird Atlas database (IDOC) contains records for all breeding bird species observed within 10-square-mile atlas blocks that are located systematically throughout the state. An atlas block consists of the west-central sixth of each 7.5' USGS topographic quadrangle map contained within the state of Illinois. As of 1989, approximately 500 atlas blocks had been completed; the goal is for all 1,072 to be completed by 1991. The INHD contains site-specific records for endangered and threatened bird species observed in Illinois.

No systematic survey of bird species has been conducted immediately within the petition area. However, two breeding bird atlas blocks are located adjacently and many sighting records have been documented for Fulton, Knox, and Peoria counties. Rice Lake and Banner Marsh State Conservation Areas are located in Fulton County and have accounted for many sighting records. Avian Ecological Investigation (IDOC) censuses were conducted for these areas in 1983.

Birds are extremely mobile organisms and individuals are not restricted to specific sites throughout a lifetime as are most mammals, herptiles, and fishes. If a suitable habitat for a locally documented bird species occurs in a certain area, individuals of that species could find and use that habitat in the future. Therefore, bird records from a particular site and a buffer zone, e.g., a target county and its adjacent counties, typically are consulted when trying to assess potential use of that site.

The distribution and abundance of reptiles and amphibians in Illinois were described by Smith (1961). Morris et al. published an updated checklist of Illinois species in 1983. The abundance of all amphibians and reptiles in Illinois has declined since 1961 and some species may now be extirpated from the state (Morris et al 1983). Other species, however, have been found to have more extensive ranges within Illinois than indicated by Smith in 1961 (Morris et al. 1983). The recent herpetological literature was searched for accounts of range extensions for Illinois species. Location records for threatened and endangered species are given in Morris and Smith (1981) and the INHD.

For more than one hundred years biologists at the INHS, IDOC, and other state agencies have conducted censuses of Illinois fishes; consequently, the reliability of the geographic and ecological distributions of fishes in Illinois rivals that of any other state. In addition to the classic The Fishes of Illinois by Forbes and Richardson (1908), five annotated lists of Illinois fishes were published during the late nineteenth and early twentieth centuries (Nelson 1876, Jordan 1878, Forbes 1884, Large 1903, and O'Donnell 1935). Between 1950 and 1978, INHS ichthyologists under the direction of Philip W. Smith and IDOC fisheries biologists under the direction of Alvin C. Lopinot conducted extensive field surveys of the streams and

rivers throughout Illinois. These surveys culminated with a new The Fishes of Illinois (Smith 1979).

There are no records of any fish collections from streams within the petition area; however, Philip W. Smith and IDOC fisheries biologists (notably Bruce Muench, Leo Rock, and Ken Russell) conducted 34 fish collections in those tributaries of the Spoon and Illinois Rivers which drain the Galesburg section of the Western Forest-Prairie Division in Fulton, Knox, and Peoria counties (Map 4). Two streams (West Fork Kickapoo Creek and French Creek) with headwaters that drain the petition area are among the streams collected by INHS and IDOC personnel. The locations of the 34 collections are listed in Appendix F.

No systematic survey of fishes within the project area was attempted during the present time. After consulting 7.5 minute series USGS topographic maps and conducting a field reconnaissance on 10 January 1990, it was determined that the streams draining the petition area can be classified as headwaters. Many fishes that occupy headwaters tend to move downstream into deeper waters during the winter months (Pflieger 1975, Smith 1979, Trautman 1981), so winter sampling would underestimate the abundance and diversity of fishes utilizing these streams during the spring, summer, and fall months. The INHS ichthyologists and the IDOC fisheries biologists conducted their surveys during the spring and summer months when fish diversity and abundance is usually at its highest in headwater streams, so the data gathered is considered adequate to complete the fisheries section of this report.

The streams in this section of the Western Forest-Prairie Division have been and continue to be adversely affected by agricultural practices and the mining of coal. Changes in the composition or abundance of fish species during the past twenty years

probably include the disappearance of species less tolerant to habitat modifications, and the increased abundance of species capable of surviving in the deteriorating stream systems.

Prehistoric and Historic Cultural Data

Prehistoric and Historical American Indian Sites

Primary references for the assessment of prehistoric sites include the following:

1) the Illinois Archaeological Survey site file, the most comprehensive listing of the states' archaeological sites;
2) Illinois Historic Preservation Agency records; and,
3) cultural resource files compiled by the Illinois State Museum.

State Museum staff integrated all of this information into the GIS under the aegis of the Lands Unsuitable for Mining Program.

The GIS cultural resource files include:

1) a listing of site designations and locations,
2) a listing of selected physiographic and cultural characteristics of sites,
3) maps of archaeological site locations and,
4) a bibliography of published archaeological reports (Bennett 1985).

Museum staff routinely update all of these files.

Archaeologists know little about prehistoric sites in Salem Township. To supplement their understanding, Museum archaeologists included information from all 154 recorded Knox County archaeological sites. They used these data to estimate the likelihood of sites in the petition area.

Historical European Archaeological Sites

Historical accounts provide information on the settlement of Knox County (Chapman 1898, Perry 1912). The earliest settlement post-dates the period of European colonization.

Historical American Archaeological and Architectural Sites

Plat maps and atlases provide information on the location of residences and other buildings. These analyses depended on three Knox County plat maps including the 1861 (M.H. Thompson), 1870 (Andreas, Lyter & Co.), and 1903 (George A. Ogle) editions. Although inclusion of a residence often depended on subscription, these maps provide the most comprehensive information on building locations. County histories provide unsystematic information about pre-1861 habitations.

Analysis of plat maps and atlases resulted in a list of potential historical archaeological sites. When a specific building did not appear on the next plat map edition, it was identified as a potential historical site. Staff confirmed this interpretation by reviewing topographic sheets. They also relied on a limited 'windshield' survey.

John and Sharon Terrell provided historical information on their property in Section 22. The property includes the former James and R. J. McKeighan residence and a blacksmith shop.

Cemeteries

The location of active cemeteries appears on U.S.G.S. topographic sheets. The Geographic Names Information System (GNIS) includes a list of features found on topographic sheets, including cemeteries. The GIS includes a coverage of cemetery locations.

Under current law, only active American cemeteries may be registered. There is no comprehensive list of unregistered cemeteries which include early American and American Indian graves. Archaeologists document the location of American Indian cemeteries, particularly those with earthworks. Many local genealogical societies are in the process of compiling information on inactive American cemeteries (e.g., Daughters of the American Revolution 1974). Staff consulted both references.

Museum staff routinely update the archaeological site and cemetery location files with new information. We consulted all of these files in the analysis of cultural resources in the Salem Township petition area.

Socioeconomic Data

Research conducted on socioeconomic resources (chpt IX and X) were compiled from a diverse set of databases. Because socioeconomics is not a unified branch of

study, it was necessary to amalgamate research in the areas of economic demography and population dynamics, as they interplay with the labor force. Economic demography is broadly defined as a branch of research dealing with the relationship between population and economics. Both the range of topics and analytical techniques are highly diverse embracing all aspects of demographic change. Population dynamics is the study of changes in population size and structure brought about by mortality, migration and fertility. The labor force is conventionally defined as the total number of persons who supply labor for the production of economic goods and services (Wilson 1985).

Data for the aforementioned chapters were derived from a variety of best-available sources including GIS databases; local, state, and national government reports, oral communication, and a computer simulation model. Widely utilized sources for Section IXA DEMOGRAPHIC COMPONENTS and Section IXB ECONOMIC INFRASTRUCTURE were the 1970 and 1980 censuses and other material derived from census data, Donnelley Demographic Files, the Dun and Bradstreet Market Identifiers which are both part of ENR's GIS; Illinois Department of Transportation files, and land use and zoning maps.

The U.S. Department of Commerce, Bureau of the Census gathers and compiles demographic and population information every decade. A vast amount of information is gathered ranging from basic population counts to truck inventory and use, to women and business. The Census of Population conducted at ten year intervals, the economic censuses conducted every five years, and the Census of Agriculture also conducted every five years were employed. The economic censuses consist of the Census of Retail, the Census of Wholesale Trade, the Census of Service Industries, the Census of Transportation, the Census of Manufacturers, the Census of

Mineral Industries, and the Census of Construction Industries. Economic Censuses include information on types of establishments, number of employees and salaries. The Agricultural Census provides information on farm type, size, and various agricultural statistics. Population and per capita income estimates are also published on a periodic basis. There are many needs for more frequent data and the Census Bureau conducts a number of monthly, quarterly and annual surveys. Most of these surveys, while providing more frequent observations, lose a certain level of detail. Many sources referenced in Chapter IX are compiled from the U.S. Census.

The Donnelley Demographic Files are prepared by Donnelley Marketing Information Services a private sector supplier of demographic data. Donnelley annually prepares current year estimates and five year projections of population, households, age/sex figures and income. Donnelley uses the latest Census Bureau figures for their projections using various demographic techniques. Projections of this kind are an ambitious project and are largely an exercise in applying a set of demographic assumptions to recent data. Therefore some projections look more reasonable than others based on critical assumptions and the quality of input data. Population projections are not always meant to be used as predictions but can be used to obtain an overall perspective for a particular area. In many instances in Chapter IX, small geographic areas were used to look at demographic trends. It is important to note that Donnelley estimates for small geographic areas should be used with a degree of caution. However, when small geographic areas are used in aggregate form, error rates are reduced considerably. Township level information was used in Chapter IX because of its availability: it should be taken relatively, as a means of comparison, rather than literally.

The Dun and Bradstreet Corporation compiles, updates and distributes information on more than seven million U.S. and Canadian business establishments and facilities. Generally the type of information that Dun and Bradstreet collects is designed primarily to provide businesses with proprietary information in order to make credit decisions, evaluate potential suppliers, and analyze firms for financial, marketing and other business reasons. The Dun and Bradstreet file was used in this report to draw a picture of business patterns in the area. The file provides a variety of information about individual business establishments. This includes geographic information, as well as, information about company size, legal status, finance and line of business. The line of business series is the key category to identifying types of facilities in Fulton, Knox and Peoria counties. It provides information about economic activities pursued by business establishments as described by the Standard Industrial Classification (SIC) code. The SIC coding system was developed by the U.S. Government under the auspices of the Office of Statistical Standards, to describe economic activity. The SIC coding system is divided into ten major areas, which are used in Chapter IX.

The data used to analyze transportation resources in Chapter IXC, Transportation were obtained from Mid State Coal Company and various divisions of the Illinois Department of Transportation (IDOT). Mid State maintains highly accurate records of coal hauling traffic; coal hauling data were based on these records. IDOT's Office of Planning and Programming provided 1988 total traffic volume counts and road condition ratings in map and tabular form. Collision diagrams and summary printouts of accident data for 1982-1988 were provided by the IDOT Division of Traffic Safety, Traffic Statistics Unit.

Data used in Chapter IXD, LAND USE AND LAND USE PLANS included information received from Fulton, Knox, and Peoria counties. Township zoning maps of scales ranging from 1:12,000 (one inch to 1,000 feet) to 1:62,500 (one inch to a mile), were the best-available sources for that information. Although the maps varied greatly in scale, they adequately represented the area. County wide land use plans were also received from the three counties. The plans were all prepared between 1967 and 1972 and, although dated, are presently the plans being used by the counties. Maps received were from the 1967 Comprehensive Plan, Galesburg and Knox County, 1972 Peoria County Proposed Land Use Plan, and 1969 Comprehensive Plan for Fulton County.

The primary tool for analyzing the impacts on Illinois' economy was the Illinois Forecasting and Simulation Model (ILFS), designed by Regional Economic Models Incorporated. This computer-based econometric model was used to assess the direct and indirect economic consequences of any change in the Illinois economy. The REMI Model will be discussed in greater detail in Chapter X SUPPLY AND DEMAND FOR COAL.

C. REGIONAL CONTEXT

Location and Size of Petition Area

The petition area is located in Salem Township in the southeast corner of Knox County. It is surrounded by the towns of Canton and Galesburg, and the larger metropolitan area of Peoria. Canton is located approximately 17 miles south of the area in Fulton County, Galesburg is approximately 25 miles northwest in Knox County, and Peoria is due east approximately 25 miles in Peoria County. Several

smaller communities including Farmington, Yates City, and Elmwood closely border the petition area (See Map 3).

The petitioned lands are comprised of eleven of the 36 sections in Salem Township (T-9-N, R-4-E, sections 13, 14, 15, 16, 21 (N 1/2, SE 1/4), 22, 23, 27, 28 (NE 1/4), 34, 35) (See Map 2). This boundary encompasses approximately 6,400 acres which are divided into roughly 81 land parcels consisting of 38 property owners represented by joint or single ownership (Table II-1). The area is characterized by gently rolling farmland with an abundance of cattle, row crops and well maintained farmsteads. Much of the area has been surface mined prior to 1977 reclamation standards so some of the old remnant spoils are used for pasturing.

TABLE II-1

PROPERTY OWNERS IN THE PETITION AREA

SECTION	PROPERTY OWNER	APPROXIMATE ACREAGE
13	Dorothy A. Bliss C/O Roger E. Windish, et al.	70.00
	John G. Hunter	40.50
	Verne & Vivian Kennelley	237.18
	Mary Lopeman	38.75
	Peabody Coal Company	36.23
	Jerome A. Powers	60.00
	C.W. Starr	20.00
	Ken Woods	145.40
14	Knochel Farms	142.40
	Glenn Rogers	154.00
	Louis F. Rogers	154.00
	Mary Sue Howell Saunders Farms, Inc.	155.00
15	Beoletto Farm Corp.	80.00
	Clair Cooper	80.00
	Clair & Gail Cooper Jr.	80.00
	James A. Kelly, Jr., et al.	160.00
	George M. & Ila A. Lawrence	240.00
16	Richard & Dorothy Altgilbers	178.50
	George M. & Ila A. Lawrence	120.00
	O. & E. Mottaz	20.00
	O.R. Mottaz, Sr.	120.00
	O.R. Mottaz, Jr.	80.00
	Bernita Saunders	81.50
	Eugene Saunders	40.00
21	Peabody Coal Company	160.00
	Earl & Rebecca J. Rogers	240.00
	Carrie & John Starcevich	80.00
22	Mary J. McDermott	77.10
	Peabody Coal Company	258.20
	Earl & Rebecca Rogers	61.80
	Carrie & John Starcevich	79.60
	Egbert & Patricia Threw	81.50
	Glenn R. Threw, Jr., c/o Claudia Threw	79.50

(Table continued)

Table II-I (Concluded)

SECTION	PROPERTY OWNER	APPROXIMATE ACREAGE
23	Mary J. McDermott	55.40
	Peabody Coal Company	8.80
	Earl & Rebecca Rogers	86.20
	Saunders Farms, Inc.	325.60
	Carrie & John Starcevich	77.00
	Egbert & Patricia Threw	27.00
	Glenn A. Threw, Jr., c/o Claudia Threw	60.00
27	Eleanor McDonald, Dennis Wagner	91.00
	Carrie & John Starcevich	389.00
	William G. Threw, et al.	160.00
28	Carrie & John Starcevich	160.00
34	Maude S. Eshelman Trust No.1, c/o Greene Farm Mgt.	160.00
	Wm. J. Hall	140.00
	E.K.	10.90
	Peabody Coal Company	80.00
	Harry & Bernita Saunders	69.10
	Egbert Threw	160.00
	G. Threw	20.00
35	Albert H. Eshelman, et al.,c/o Greene Farm Mgt.	52.10
	Maude S. Eshelman Trust No. 1, c/o Greene Farm Mgt.	154.00
	Peabody Coal Company	235.50
	Everett & Arlene Staffeldt	185.40

Source: Knox County, Illinois Land Atlas and Plat Book. 1988.

Natural Divisions of Illinois

Fourteen natural regions, known as natural divisions and distinguished by major differences in topography, glacial history, bedrock, soil, flora and fauna, have been recognized within Illinois (Schwegman 1973). The natural divisions have been subdivided into 33 sections, based on smaller differences in these features within divisions. This classification was developed by the Illinois Nature Preserves

Commission as a basis for identifying significant types of natural features that should be represented in the state's nature preserves system. Within this framework it is possible to recognize distinctive natural features such as landforms and geological formations, terrestrial and aquatic biological communities and archaeological sites that should be preserved.

The petition area lies within the Galesburg section of the Western Forest-Prairie Division (Map 4). The following description of this natural division is from Schwegman (1973). The region consists of a strongly-dissected glacial till plain, with numerous ravines among the level to rolling uplands. Outcrops of Pennsylvanian and Mississippian bedrock of limestone, sandstone, shale and coal occur along its major streams. Most of the bedrock in the region is covered by glacial drift from the Illinoian stage and the soils have developed in ten to fifteen feet of loess. Prairie soils are high in organic matter (similar to those of the Grand Prairie Division), while the forest soils are acidic and low in organic content. The presettlement vegetation of the region consisted primarily of forest, but large prairies existed on the level uplands. Upland forests were oak-hickory associations dominated by white oak, black oak and hickory species. Post oak-blackjack oak communities occurred on fine-textured soils on steep slopes and along the margins of prairies. Dominant species in the mesic forests were white oak, red oak, basswood, sugar maple and slippery elm. Floodplain forests were dominated by silver maple, American elm, box elder and ashes. Wet prairie and marsh were less frequent in this division than in the Grand Prairie Division, but vegetation was similar. This division is divided by the Illinois River, with the Galesburg section lying north of the river. Presettlement vegetation consisted equally of forest and prairie in this section, whereas the Carlinville section to the south was predominantly forested.

Cultural Setting

Introduction

The activities of three diverse cultures make up Illinois' past -- American Indians, Europeans, and after the American Revolution, Americans. Archaeologists and historians divide human history into periods (Table II-2). Each period represents a significant change in lifeways.

American Indians first inhabited Illinois at least 12,000 years ago. For the next 11,600 years their numbers increased and their culture evolved. Historians view the journal of Father Jacques Marquette as Illinois' first recorded history. In A.D. 1673 Marquette and Louis Jolliet traveled along the Illinois River. Along the way, Marquette recorded his observations of the landscape and its native inhabitants.

Written records provide only a partial account of human life. Archaeological investigations provide the only perspective on prehistoric life and supplements historical records for Illinois history.

The following overview summarizes Illinois prehistory and history with special attention to Knox County.

TABLE II-2

CULTURE HISTORY OF KNOX COUNTY

Culture			Chronology in Years B.C./A.D.
American Indian	European	American	
		Contemporary	A.D. 1920 - 1990
		Early Industrial	A.D. 1860 - 1920
		Homestead	A.D. 1830 - 1860
		Frontier	A.D. 1783 - 1830
	Colonial		A.D. 1673 - 1783
Historical			A.D. 1673 - 1845
Oneota			A.D. 1375 - ?
Mississippian			A.D. 1000 - 1400
Late Woodland			A.D. 300 - 1000
Middle Woodland			200 B.C. - A.D. 300
Early Woodland			600 B.C. - 200 B.C.
Late Archaic			2550 B.C. - 600 B.C.
Middle Archaic			6000 B.C. - 2550 B.C.
Early Archaic			8000 B.C. - 6000 B.C.
Paleo-Indian			? - 8000 B.C.

American Indians

American Indians arrived in Illinois at least 12,000 years ago (10,000 B.C.), in the waning stages of the Ice Age. During this time human groups adapted to significant shifts in climate and changes in flora and fauna. In addition to widespread extinction of specific mammal species, there were significant range variations in other plant and animal communities. Evidence of these people is rare; there are few documented sites. Based on information from throughout North America, archaeologists designate the period between at least 10,000 B.C. and 8,000 B.C. as Paleo-Indian. Organized in small, mobile groups, Paleo-Indians hunted an assortment of mammals, including the now-extinct mastodon (*Mastodon americanus*). They also consumed a

variety of plant foods, including nuts. Paleo-Indian sites are most common in upland settings. Alluvium may bury stream valley sites. The scarcity of sites is evidence for a low population density. The low frequency of artifacts at Paleo-Indian sites is attributable to short-term occupations by small groups.

Archaeologists subdivide the Archaic period into three parts: early, middle and late. New artifact types, site locations, and food remains signal a change in American Indian culture. Early Archaic peoples adapted to expanding post-Pleistocene habitats. About 8,500 years ago (6,500 B.C.), North American climate became warmer and dryer. Known as the Hypsithermal Interval (Deevey and Flint 1957), prairie habitats expanded eastward across central Illinois (King 1981). As a result there was a significant reorganization of the type and distribution of plants and animals.

American Indian culture changed, in part, in response to this climate change. Before 7,000 B.C., early Archaic lifeways probably corresponded to that of Paleo-Indian groups. Widely distributed Early Archaic sites in upland settings have few artifacts. Due to limited study, however, archaeologists know little about their inhabitants way of life. Recent excavations show that by 6,000 B.C. American Indians inhabited extensive villages. These villages and associated cemeteries signify a commitment to specific areas. Food remains represent a broad-spectrum of plants and animals. Aquatic resources, fish and shellfish, represent a significant portion of the diet for the first time.

Based on more intensive hunting, fishing, and gathering, Middle Archaic peoples set up large, semi-permanent villages. Archaeologists find Archaic sites throughout the state, but the evidence suggests that population density shifted to riverine settings.

There is evidence for plant horticulture during the Middle Archaic. Indian groups grew selected native plants for food and non-native plants, like squash (*Cucurbita pepo*), for containers.

Late Archaic peoples lifeway followed the Middle Archaic pattern, but they intensified their commitment to specific aspects. For the first time cultivated plants provided a significant portion of food. Indians cultivated native plants like goosefoot (*Chenopodium berlandieri*) and marshelder (*Iva annua*). Late Archaic peoples built large villages in the valleys of major rivers and smaller, less permanent camps in upland settings nearby.

Archaeologists commonly recognize the presence of primitive earthenware pottery as the beginning of Woodland cultures. Although the differences between Archaic and Woodland lifeways are mostly indistinct, pottery containers represent a dramatic change in American Indian technology. Pottery vessels were durable storage and cooking containers, superior to skin, fabric, and wooden containers. Archaeologists have studied few Early Woodland sites. As a result, we know little about this culture.

Beginning about 200 B.C. Indians built large villages along major rivers in the state. Although earlier cultures used mounds to mark their graves, Middle Woodland Indians constructed large conical mounds that often contained the graves of several individuals. These peoples relied on a varied diet of animals, including terrestrial and aquatic species. They also ate wild and domesticated native plants. Middle Woodland peoples also obtained exotic materials from sources throughout North America. These artifacts represent a significant part of Middle Woodland artifact assemblages.

The disappearance of typical Middle Woodland artifacts, mortuary construction, and trade marks the beginning of the Late Woodland period. The cause of this change is unknown. Late Woodland peoples continued to occupy villages inhabited during the Middle Woodland period. They also built new villages along tributary streams in upland settings. Cultivated plants provided an increasingly larger fraction of food. For the first time, they used a non-native plant food -- corn (*Zea mays*). Hunting technology advanced dramatically with the invention of the bow and arrow about A.D. 500.

The Mississippian period marks a elaboration of American Indian culture. Like the Middle Woodland period, there is a pan-regional link between Indian communities. Villages from Oklahoma to Georgia, and Louisiana to Wisconsin, interacted. Population density climbed to new levels. In addition to hamlets and villages, towns and cities appeared. As many as 10,000 people inhabited Cahokia, the premier Mississippian city, located near the modern town of Collinsville, Illinois. Mississippian society was ranked. It included common, craft, political, and ritual classes. The importance of corn expanded dramatically, although native foods still provided a large fraction of their diet. In addition, Mississippian material culture reflected advances in stone tool and pottery technology.

By A.D. 1400 Mississippian culture declined in Illinois. Oneota groups thought to have migrated from Iowa and Minnesota, appeared in the late 1200's. Much less organized than Mississippian society, Oneota peoples lived in large villages along major rivers. They relied on native foods and cultivated plants. Limited studies of Oneota sites reveal an unprecedented level of inter-group strife. However, the lack

of documented sites obscures the differences between Oneota lifeways and those of the tribes encountered later by French explorers.

Knox County Prehistory

Archaeologists know relatively little about Knox County prehistory. Primarily unsystematic survey accounts for the inventory of 154 archaeological sites on record with the Illinois Archaeological Survey. The Haw Creek site (11Kx3), a Middle Woodland site on a major tributary of the Spoon River, is the only extensively excavated prehistoric site in the county (McGimsey 1988). Lewis (1978), Lewis and Murphy (1978, 1981), and Benchley et al. (1981) incorporated Knox County site data in a study to estimate the distribution of prehistoric sites in a section of west-central Illinois.

Investigations conducted under the provisions of Federal historic preservation laws account for most recent archaeological studies in Knox County. The Illinois Department of Transportation is the primary sponsor of archaeological work in Knox County. These projects include the excavations at Haw Creek site, and surface reconnaissance in the Cedar Creek drainage (Dwyer and Burge 1978; Moore et al. 1981). Other cultural resource management projects include site survey near Knoxville (Freimuth 1980) and St. Augustine (Harn 1976).

These projects and occasional contributions by local residents account for the 154 recorded archaeological sites in the county. Table II-3 presents a breakdown of Knox County sites by cultural affiliation. The list includes representatives of all periods except Middle Archaic. The apparent lack of Middle Archaic sites is probably due to

TABLE II-3

KNOX COUNTY ARCHAEOLOGICAL SITES BY CULTURAL AFFILIATION

Cultural Affiliation	Frequency
Historic-American	5
Historic-American Indian	17
Mississippian	0
Late Woodland	4
Middle Woodland	3
Early Woodland	1
Woodland	5
Late Archaic	1
Middle Archaic	0
Early Archaic	2
Archaic	18
Paleo-Indian	1
Multicomponent	2
Archaic-Woodland-Historic American	1
Archaic-Woodland-Mississippian	1
Archaic-Woodland	5
Unknown	88
Total	154

Source: Illinois State Geographic Information System Database and Illinois Archaeological Survey.

an only recently developed understanding of Middle Archaic material culture. It is likely that reexamination of Knox County site collections would uncover some Middle Archaic artifacts.

Archaic sites are most common, not surprising when one considers that the Archaic period is nearly four times longer than the next longest period duration. Due to the lack of information, it is difficult to expand on Knox County prehistory. In brief,

American Indian groups inhabited the area throughout prehistory. More systematic survey would certainly result in the discovery of additional prehistoric sites.

The frequency of historical American Indian sites is particularly interesting. Few locations of these villages have been confirmed, but historical documents clearly show that the Potawatomi in particular occupied villages in Knox County. Maple (1912:45), for example, refers to a Potawatomi village in Section 25 of Salem Township. Clark (1968:146) reports two Potawatomi villages just south of Salem Township near Farmington in Fulton County. The Potawatomi built villages three miles east and 1 1/2 miles north of Farmington. The village north of Farmington may be the same one referred to by Maple.

Historical American Indians and Europeans

In 1673 Father Jacques Marquette and Louis Jolliet plied the Illinois River northward to the Chicago portage. Marquette's recollections of this journey -- his journal was lost on Lake Michigan -- is the first historical account of Illinois. French explorers met many American Indian tribes including the Illiniwek, Peoria, Tamaroa, Sauk, and Fox. Later, the Kickapoo, Potawatomi, Miami, and Shawnee inhabited the state.

The French built missions at Cahokia and Kaskaskia in 1699 and 1703. They erected forts near present day Prairie du Rocher, Peoria, and Starved Rock to facilitate trade with Indians.

American Indian culture changed rapidly through European contact. Trade goods of metal and glass quickly replaced native stone and ceramic technology.

The British gained control of the Illinois country in 1763, but their rule lasted only for a brief time. With the capture of Vincennes, Indiana by George Rogers Clark, the Illinois country became part of the American colonies.

There is no record of European sites in Salem Township.

Americans

Three periods of Illinois history -- frontier, homestead, and early Industrial -- deserve recognition in this context. After the American Revolution, a significant number of settlers moved to the Illinois country. Primarily of Scotch-Irish descent, these people settled wooded areas near streams. Their lifeways mirrored that of American Indians in that they relied on a blend of natural and domesticated foods.

European and American colonization of the Illinois country placed unprecedented pressure on American Indian groups. Their numbers dwindling and their territory shrinking, many tribes tried to stem colonization through conflict. Their loss of the Black Hawk War in 1836 signaled the end of their welcomed presence in Illinois. Between 1836 and 1845 most American Indian tribes voluntarily, or by escort, moved west of the Mississippi River.

During the homestead era, the population of the Illinois country expanded dramatically. The invention of the self-cleaning plow and reaper enabled farmers to cultivate large tracts of the prairie for the first time. Farm production shifted from simple subsistence based to a commercial enterprise. The demand of east coast markets and growing cities in the midwest spurred farmers to clear larger tracts of land.

The end of Civil War marked the beginning of the Early Industrial era. Illinois cities became centers for distilling, steel, meat packing, and furniture industries. Railroad routes developed to distribute raw materials like coal and finished goods. The demand of cities continued to stimulate the growth of small towns.

Salem Township History

Although first delineated in 1790, Knox County assumed its current boundaries in 1839. In 1834, Alexander Taylor became the first resident of what would become Salem Township on April 5, 1853 (Perry 1912). According to Gale (1899:953), Taylor built his home in the northeast quarter of Section 6.

There are few references to the settlements of the first American pioneers. Perry (1912:443) refers to a log schoolhouse in Section 29. Later, Perry (ibid) notes Michael Egan's home stood nearby. William Kent's home (Section 13) served as church in 1835 or 1836 (Gale 1899:953). In 1835 or 1836, James Mason built a saw mill in Section 13 along Kickapoo Creek. Later, Anderson Corbin built another mill on the same stream in Section 14 (Gale 1899:953).

Of particular interest is James McKeighan's home, built in the early 1850's in Section 22. The McKeighan home is now the residence of John and Sharon Terrell. James McKeighan, a native of Ireland, moved to Salem Township in 1849 or 1850. He developed a successful farm and raised four children. Noteworthy among his children is R. J. McKeighan. R. J. McKeighan's contribution to agriculture include development of McKeighan's Golden Dent hybrid corn (Perry 1912:763) and a design for a gang and sulky plow (Chapman 1886:540).

The locations of 37 residences in the sections of Salem Township under investigation appear on the 1861 plat map (Thompson 1861). Many of these structures remain. The locations of razed mid-19th-century structures may represent interesting historical archaeological sites.

Administrative Divisions

The petition area falls completely within Salem Township in Knox County. The Knox County Zoning Department is responsible for zoning matters within the petition area. A Knox County Board Land Use Committee has been established to handle the duties formerly carried out by the Planning Commission.

Knox County is located in the service area of the Western Illinois Regional Council (WIRC) although the county is not an active member of the Commission. Other counties in the service area of the WIRC include Fulton, Hancock, Henderson, McDonough, and Warren (Map 5). Peoria County is adjacent to the eastern edge of the petition site and falls within the jurisdiction of the Tri-County Regional Planning Commission. The other two counties in this Planning Commission are Tazewell and Woodford. These counties also comprise the Peoria Standard Metropolitan Statistical Area (SMSA).

Unfortunately all state departments do not utilize the same regions when dividing the state. The Illinois Environmental Protection Agency (IEPA) for their Illinois Water Quality Management Plan recognizes three areawide regional planning commissions (Northern Illinois Planning Commission -NIPC- around Chicago, Southwestern Illinois Metropolitan and Regional Planning Commission -SIMAPC- near St. Louis,

and the Greater Egypt Regional Planning and Development Commission -GERPDC- in southern Illinois). Each of these regional commissions have developed their own water quality plans. The State Water Quality Management Plan covers the remaining 83 counties, including Knox and its surrounding counties.

The State Department of Transportation has divided the state into nine Districts. Knox, Fulton, and Peoria counties all fall into District 4.

The petition area falls in the 17th Federal Congressional District, the 47th State Senatorial District and the 94th State Representative District.

CHAPTER III

GEOLOGICAL RESOURCES

A. REGIONAL GEOLOGIC SETTING

This discussion pertains to a nine-county area in western Illinois centered around Knox, Peoria, and Fulton Counties (Map 6). The regional geologic setting in this area consists of a thick sequence of Paleozoic sedimentary rocks that are overlain by younger Quaternary (mostly glacial) deposits (Figure III-1). The Paleozoic rocks range in age from Cambrian to Pennsylvanian and are dominantly of marine origin. These rocks represent repeated invasions of ancient seas into what is now the mid-continent region. The Paleozoic rocks maintain a slight regional dip to the south southeast toward the deepest part of the Illinois Basin, a spoon-shaped structure toward the center of which bedrock throughout most of Illinois maintains a regional dip.

In western Illinois, the near-surface Paleozoic rocks range in age from Silurian to Pennsylvanian. Exposures of rocks older than Mississippian are limited, and these rocks are known mainly from deep drill holes. Mississippian rocks crop out in the western and southern parts of the western Illinois region, and exposures of Pennsylvanian rocks are numerous in stream valleys throughout the region. Overlying the near-surface bedrock units are Quaternary materials (Figure III-1 and Map 7). These deposits are mainly of glacial origin and consist of till (ice-deposited material), sand, gravel, loess (windblown silt) and alluvium (stream deposits).

FIGURE III-1

STRATIGRAPHY OF THE PRINCIPAL GEOLOGIC UNITS IN WESTERN ILLINOIS

		stage	significant deposits		lithology	thickness
QUATERNARY SYSTEM	Pleistocene Series	Holocene		Cahokia Alluvium	silt, sand gravel, clay	0-20
		Wisconsinan	Peoria Loess Roxana Silt		silt	0-10
		Sangamonian	Glasford Fm.		till, sand gravel, silt	0-90
		Illinoian				
		Yarmouthian	Banner Fm.		till, sand gravel, silt clay	0-40
		Kansan				

era	system	significant group or formation		lithology	thickness
PALEOZOIC	Pennsylvanian	Bond Fm.		shale, sandstone coal, limestone	100-450
		Modesto Fm.			
		Carbondale Fm.	Danville Coal Herrin Coal Springfield Coal Colchester Coal		
		Spoon Fm.			
		Abbott Fm.			
	Mississippian	Burlington-Keokuk Ls.		limestone	250-400
	Devonian			limestone	160-400
	Silurian			dolomite	
	Ordovician	Platteville G. + Galena G. Glenwood Fm. + St.Peter Ss.		dolomite sandstone	250-325 200-300 } 1500
	Cambrian			dolomite	~2300
Precambrian rocks				granite	

Paleozoic Rocks

Cambrian deposits, which underlie all of Illinois, are the oldest Paleozoic rocks in the region and are separated from the underlying igneous basement rocks (Precambrian) by a great unconformity. Cambrian rocks are overlain by Ordovician rocks and the Cambrian-Ordovician sequence is predominately dolomite, although some sandstone formations are present.

Rocks of the Cambrian and Ordovician Systems range in thickness from 2,900 to 3,900 feet, and the top of the Ordovician lies at depths of less than 600 to over 1,100 feet below the surface. The St. Peter Sandstone, the Glenwood Formation (mostly sandstone) and the overlying Platteville and Galena Dolomite Groups (all Ordovician) occur near the top of the Cambrian-Ordovician succession. All of these rocks have been targeted as a source of drinking water throughout much of the western Illinois region.

The St. Peter Sandstone is reported to be 200 to 300 feet thick in area wells (Wanless 1957). The St. Peter, however, is overlain by similar sandstones of the Glenwood Formation and these two units may be erroneously combined as one unit in well records. The St. Peter is usually 200 to 250 feet thick, and the St. Peter-Glenwood interval totals approximately 300 feet. This interval has been encountered in wells throughout western Illinois at depths of approximately 1,000 to 1,500 feet.

The St. Peter and Glenwood sandstones are overlain by rocks of the Platteville and Galena Groups. These rocks consist mainly of dolomite and are approximately 250 to 325 feet thick. The Platteville-Galena succession is found at depths of 900 to 1,250 feet below ground surface. The St. Peter and Glenwood Sandstones and the

Platteville and Galena Dolomite Groups are proven aquifers in much of western and northern Illinois. These waters become more highly mineralized with distance toward the center of the Illinois Basin (Walker, Bergstrom and Walton 1965). The Galena Group is overlain by up to 200 feet of Ordovician shale and limestone belonging to the Maquoketa Shale Group.

Above the Ordovician rocks are dolomites and limestones of Silurian age. The Silurian rocks are overlain by Devonian limestones, dolomites and shales. In western Illinois the combined thickness of the Silurian-Devonian interval is approximately 160 to 400 feet, and the rocks have been encountered in wells at depths of less than 600 feet in the north to 950 feet in the central and southern portions of the region. Crevices in the Silurian and Devonian strata can yield substantial amounts of water (Walker, Bergstrom and Walton 1965).

Thick limestones and shales of Mississippian age rest unconformably on Devonian rocks. The Mississippian rocks are approximately 250 to 400 feet thick in western Illinois and are found at depths of 200 to 500 feet. The Mississippian rocks are the near-surface rocks in parts of McDonough, Schuyler, Warren, Fulton, and Knox counties. Outcrops of Mississippian Burlington Limestone are present in southwestern Knox County along Cedar Creek. The Keokuk and Burlington Limestone interval, with a combined thickness of 150 to 200 feet, is a proven source for drinking water in this area. Other Mississippian rocks rarely yield appreciable quantities of water.

The Mississippian units are overlain unconformably by rocks of Pennsylvanian age, and these are the near-surface rocks throughout much of the area. Although numerous outcrops of Pennsylvanian rocks are present in stream valleys, these rocks

are usually covered with younger Quaternary deposits. Many exposures in Knox, Fulton, and Peoria counties have been described in detail by Wanless (1957) and Savage (1921). Pennsylvanian units consist mainly of gray and black shales, thin limestone, sandstone and coal. The thickness of the Pennsylvanian ranges from 0 to 450 feet, with the thickest deposits occurring in southwestern Peoria and northeastern Fulton counties (Wanless 1957). The top of the Pennsylvanian succession can usually be found at depths of 30 to 100 below ground surface.

Five formations are included in the Pennsylvanian System in the western Illinois region. From oldest to youngest, these are the Abbott, Spoon, Carbondale, Modesto and Bond Formations (Figure III-1). Of these five formations, the Carbondale is the most widespread, and this formation contains the coal seams that have been mined throughout the western Illinois area.

Rocks of the Abbott and Spoon Formations generally consist of sandstones, shale, thin coals, and limestones. In this area, the Abbott Formation rests unconformably on Mississippian rocks. Coal from these formations is not thick enough to mine on a large scale in western Illinois. The sandstones and limestones are usually thin and their extent is limited and therefore not generally targeted as a source for water.

The base of the Carbondale Formation is marked by the Colchester (No. 2) Coal Member and all stratigraphic units below the Colchester Coal belong to the Spoon and Abbott Formations. The Colchester, Springfield (No. 5), and Herrin (No. 6) Coal Members of the Carbondale Formation are the most widespread and minable coal seams in the western Illinois area. The Danville (No. 7) Coal is also present although in most areas it is not thick enough to represent an potential resource for mining.

The Colchester Coal Member has been mined throughout western and northern Illinois, in both underground and surface operations. In western Illinois the thickness of the Colchester Coal is 2.0 to 3.5 feet. Its consistent thickness makes it a reliable stratigraphic marker throughout much of Illinois. In southern Knox County, the Colchester Coal is too deep to be considered for surface mining operations and too thin for underground extraction.

The Springfield Coal Member has been mined extensively in western Illinois and has been mined in areas directly adjacent to the petition area. The thickness and distribution of Springfield Coal has been studied in detail for a number of years. Worthen (1870) applied the number '5' to this coal during early studies of the geology of Fulton County. The thickness of the Springfield Coal throughout most of the region is 3.5 to 6 feet. It is second only to the Herrin Coal in commercial importance in Illinois (Hopkins and Simon 1975).

The Herrin Coal Member has been mined extensively throughout much of Illinois, in parts of the petition area, and in areas directly adjacent to it. The Herrin Coal is a normal, bright-banded coal. Its lower portion contains a prominent claystone parting (the 'blue band') that is normally 1 - 3 inches thick (Hopkins and Simon 1975). Where the coal is present in the western Illinois area, it is usually 4 to 4.5 feet thick.

The Carbondale Formation contains other coals, including the Wiley, Summum (No. 4) and Danville Coal Members, that are usually thin or discontinuous and do not constitute an attractive mining prospect like the Colchester, Springfield and Herrin Coals. Coal reserve estimate information for all minable coal seams in Illinois is available in Treworgy, Bengal and Dingwell (1978) and Treworgy and Bargh

(1982). Reserves are discussed in detail in Chapters III and X of this report. Additional discussion of coal seams can be found in the Description of Coal Seams and Geology of the Petition Area sections of Chapter III.

Quaternary Deposits

Pennsylvanian rocks are overlain unconformably by Quaternary deposits. Quaternary deposits in the region consist of glacial tills, outwash, and loess, as well as Holocene colluvium and alluvium (Figure III-1). These materials differ from bedrock units in that they are a combination of loose and overconolidated soil materials.

The oldest Quaternary deposits in the area are included in the Banner and Wolf Creek Formations. Both formations include glacial tills, sand, gravel, and silt. The till is a compact mixture of sand, silt, clay and pebbles that was deposited by pre-Illinoian age glacial ice. In many areas in western Illinois, the Banner and Wolf Creek Formations rest directly on bedrock. The Wolf Creek is probably confined largely to extreme western Illinois and Iowa and is not known to occur in the vicinity of the petition area.

Overlying the Banner Formation are Illinoian age deposits of the Glasford Formation. The Glasford consists of till, discontinuous sand and gravel lenses, and some silt. Three units are present in the Glasford and widespread throughout western Illinois; the Kellerville, Hulick, and Radnor Till Members.

Two Wisconsinan age silt formations overlie the Glasford Formation. Both formations, the Roxana Silt and the Peoria Loess, are loesses (wind-blown silt)

consisting of up to 90 percent silt with some fine sand and clay. The combined thickness of the Roxana and Peoria is 10 to 15 feet. The majority of upland soils are developed in these materials.

The youngest geologic material in the western Illinois area is the Cahokia Alluvium (Holocene), a unit made up of sediments transported and deposited by streams and rivers. Cahokia Alluvium consists of fine-grained materials (usually silty clay and silt loam) with some sands and gravels.

A detailed discussion of the geological setting of the petition area is contained in Section IIIB.

Mining History and Coal Resources

Coal has been mined in the western Illinois area since about 1880. The extent of surface mining is shown on Map 7. This section presents both a brief overview of the mining history as well as a description of specific coal seams. Information from several reports was used to for this section including Wanless (1957), Smith and Berggren (1963), Treworgy, Bengal and Dingwell (1978), Illinois State Geological Survey (1978), Samson (1983), and the Environmental Systems Application Center (1983). Additional information on coal production was compiled from the Illinois Department of Mines and Minerals Annual Coal, Oil and Gas Reports. The coal resources of the petition area are also discussed in Chapter X of this report.

The following are definitions of terms used in this report for coal resources, reserves, and recoverable reserves.

Resources: Surface-minable coal resources are defined by the Illinois State Geological Survey as coal 18 inches or greater in thickness and less than 150 feet deep. This classification includes coal that cannot be economically or legally mined at the present time. Resource estimates do not directly indicate how suitable the coal is for mining, how costly it will be to mine, what the legal restrictions may be, or where future mining is most likely. Resources increase when more coal is discovered and decrease when coal is mined out.

Reserves: The portion of the resource in the ground that may be considered minable is the reserve. The criteria used to define reserves are explained in Treworgy, Bengal and Dingwell (1978). Many factors affecting the minability of coal are difficult or impractical to evaluate and these may change over relatively short periods of time. These factors include the demand for coal, land ownership, availability of transportation, quality of coal, and shape of the mining block.

Recoverable Reserves: The term recoverable reserve used in this report refers to the quantity of salable clean coal that is produced from a surface mine after mining and cleaning losses. The recoverable reserves in a typical surface mining operation might range from 75 to 80 percent of the reserve, depending on factors such as mining conditions, handling methods, cleaning procedures, and mineral partings in the coal.

Mining block: This refers to contiguous areas of coal or noncontiguous but nearly adjacent areas that are not separated by obstructions such as rivers, towns, highways, or oil and gas wells. To be considered a minable deposit, coal must also occur in blocks of considerable tonnage.

Underground Mining

Underground mining methods were used in western Illinois until the 1920s when surface mining operations started on a large scale. Although there were many underground mines, most were small shaft, slope and drift operations; all have been abandoned. The cumulative underground coal production from the nine-county western Illinois region (Henry, Bureau, Warren, Knox, Stark, McDonough, Fulton, Peoria, and Schuyler) from 1882 through 1982 was about 207 million tons. Statewide coal production from underground mines during the same period exceeded 3.5 billion tons.

Approximately 2.1 billion tons of deep minable coal resources exist in the nine-county region (Treworgy and Bargh 1982). Much of this coal has a low development potential because it is generally thin and overlain by relatively thick glacial drift and thin rock, conditions that may hamper underground mining. Glacial drift to rock thickness ratios greater than 1:1 may cause unstable roof conditions in underground mines.

Surface Mining

All present coal production in the area is from surface mines. The cumulative production from the mines in the nine-county region between 1882 and 1982 was approximately 362 million tons. Production during the 1980's (1980-1988) has totalled about 21 million tons, roughly ten percent of all coal produced in the state during that time.

There are over 2.7 billion tons of surface minable coal resources in the nine-county area and mining blocks containing 1.6 billion tons of this coal are free from obstructions that may hamper mining efforts (Treworgy, Bengal and Dingwell 1978). Maps 8, 9, 10 and 11 show the distribution of surface minable reserves in the area. These maps from Treworgy, Bengal and Dingwell (1978) show 1975 reserve estimates.

As of 1975, Knox County ranked fourth among all counties in the state for surface minable reserves with 520 million tons. Peoria County ranked third with 642 million tons and Fulton County ranked first with 672 million tons. Although these reserve estimates and the maps (Maps 8, 9, 10, 11) indicate numerous coal blocks in western Illinois, factors such as mineral rights and land ownership may interfere with mining plans for any of the coal blocks. Additional site-specific or proprietary geologic data may lower the estimated coal tonnage in a given block. New information may reveal factors such as cut outs or split coal areas that will affect the minability of the resource. Additional information may also identify previously unrecognized reserves.

Surface mining methods and reclamation practices were modified substantially with the enactment of the Illinois Surface Coal Mining Land Conservation and Reclamation Act in 1979. The act provides for reclamation of abandoned mine lands, sets performance standards for surface and underground mining (including reclamation standards), and defines those conditions under which mining is prohibited. With its many requirements, the act aims to improve reclamation techniques by specifying (1) the handling and replacement of geologic materials in such a way as to isolate acid-producing materials from the near-surface environment, (2) return of the land to premining contour, and (3) revegetation and productivity standards. As such, reclamation performed under the law is and will be substantially

different from the pre-law mining practices prevalent in western Illinois prior to 1979.

Description of Coal Seams

In the past, several coal seams have been worked by both underground and surface mining operations. Active surface mines in western Illinois are mining coal from the Colchester, Springfield, and Herrin Coal Members. These coal seams, along with the Danville Coal, represent the bulk of the resources that will continue to be mined in this area.

Rock Island (No. 1) Coal Member -- This coal has been worked by several smaller mining operations in Henry County and to a lesser extent in Warren, Knox and Fulton Counties: there is no active mining of this seam. Thick Rock Island Coal is not widespread, but rarely, thicker deposits (4 to 5 feet) occur as narrow troughs.

Colchester Coal Member -- This coal, described by Worthen (1870) near the town of Colchester in McDonough County, is one of the most extensive of the surface-minable coals in western and northern Illinois (Maps 8 and 9). The Colchester Coal is usually 2.5 to 3 feet thick. Its thickness is so consistent over large areas of Illinois that it has been referred to as 'the 30-inch coal'. The Colchester has not been mined as extensively as the thicker Springfield and Herrin Coals, but was mined in many small drift mines before the period of extensive surface mining.

The quality of the Colchester is average for coal in the western Illinois area, having a sulfur content of 2 to 4 percent. The consistent thickness of the coal, the relatively soft overburden, and the proximity to barge transportation along the Illinois River

have favored development in the western Illinois area. Several active surface mines are producing coal from the Colchester including the Freeman United Industry Mine in McDonough and Schuyler counties, and the Black Beauty Cedar Creek Mine in Brown and Schuyler counties.

Summum Coal Member -- The Summum Coal is another widely distributed seam which is only locally thick enough for a mining operation. The Summum Coal is a lenticular coal which, when present, usually lies between 15 to 25 feet below the Springfield Coal. Although the Summum Coal is one of the most widely traceable stratigraphic coal horizons in Illinois, its thickness is variable and minable deposits are limited. It has been mined near Soperville in Knox County, and Summum in Fulton County. No active operations work the Summum Coal.

Springfield Coal Member -- This coal (Maps 8 and 9) is the most extensively mined coal in the western Illinois area. It is a widespread deposit with an average thickness of 3.5 to 5.5 feet. Underground operations worked the Springfield Coal in many areas but in recent years all mining has been from surface mines.

The Mid State Rapatee Mine in Knox and Fulton counties is the only active surface mine in the Salem Township area. In that mine, Mid State is mining the Springfield Coal, one of the two minable coal seams present in the petition area.

Herrin Coal Member -- The Herrin Coal (Maps 10 and 11) is an extensive deposit found throughout most of the western Illinois area. The average thickness of the Herrin is approximately 4 to 5 feet. It is characterized by partings of blue-gray clay about 1/4 to 3 inches thick known as the 'blue band'. Wanless (1957) noted a discontinuous deposit of light gray sandy shale or calcareous sandstone, called 'white

top', that locally replaces the upper part of the coal and very locally, the entire seam. The white top and the blue band represent impurities that affect production from the Herrin Coal in the western Illinois area.

Surface-minable deposits of the Herrin Coal exist in Peoria, Knox and Fulton counties (Maps 8, 9, 10 and 11). There are currently no active mines working the Herrin Coal in the Salem Township area. The Herrin Coal is one of the coal seams that has been mined by surface operations in parts of, and adjacent to, the petition area. Reserves of the Herrin Coal remain in this area.

Danville Coal Member -- Reserves of this coal seam are present in western Illinois. The coal ranges in thickness from 1.5 to 2.5 feet, and it has been recorded in borings in parts of the Salem Township Petition Area. Surface-minable reserves of the Danville Coal have been mapped in Peoria County (Maps 8 and 9).

When compared to the same coal seams in southern Illinois, the quality of the western Illinois coals have lower heating values (Btu's) and higher sulfur contents. Coal from some of the western Illinois mines has a lower ash content. The principle coals in western Illinois (Colchester, Springfield, and Herrin) are usually shallow and overlain by relatively thick glacial drift and thin bedrock, making them easy to surface mine. Locally, two seams such as the Springfield and the Herrin may be separated by a small vertical distance, thus providing the opportunity to mine two seams at one surface operation.

B. GEOLOGY OF THE PETITION AREA

Site Geomorphology

The petition area (Map 12) lies in an area of Knox County that has been glaciated at least three or more times. Glacial ice has shaped the landscape by scouring the pre-glacial bedrock surface and depositing additional materials on the landscape. Presently, the bedrock surface (Map 13) is buried by as much as 100 feet of glacial deposits (Map 18). The character of the bedrock surface has influenced the deposition of the younger glacial materials and to some extent, the establishment of modern drainage in the area. The present topography of the petition area and vicinity mimics the character of the bedrock surface, i.e., the topographic highs in the southern and central parts of the petition area are also places where the bedrock surface is relatively high. The low areas on the bedrock surface coincide with the lower areas along the West Fork of Kickapoo Creek in the northern part of the petition area (Map 12).

The prominent topographic features in the area include the elongated hills in the southern and central part of the petition area. Surface elevations are highest in this area, just over 760 feet in the very southern part of the petition area (Map 12). Total relief is approximately 160 feet with a low elevation of just under 600 feet along the West Fork of Kickapoo Creek in the northeastern portion of the petition area.

Surface coal mines have operated in and adjacent to the petition area. The unreclaimed pre-law mined land is characterized by very hummocky topography and many small lakes. Drainage patterns in these areas differ from premining conditions as some of the surface runoff is diverted into the many small lakes (Map 12).

Site Stratigraphy and Spatial Distribution of Geologic Units

The stratigraphy of the petition area consists of unconsolidated Quaternary deposits that overlie Pennsylvanian bedrock units (Figure III-2). The stratigraphic information presented in this section is based on (1) published manuscripts as cited in the discussion, (2) geologic records (well logs, field notes, and unpublished reports on file at the State Geological Survey), and (3) well logs and other information provided by Mid State Coal Company.

FIGURE III-2

STRATIGRAPHY OF SELECTED GEOLOGIC UNITS IN THE PETITION AREA

SYSTEM	STAGE	FORMATION		LITHOLOGY	THICKNESS (feet)
QUATERNARY	Holocene	Cahokia Alluvium		silt, silty clay, sand	0-20
	Wisconsinan	Peoria Loess and Roxana Silt		clayey silt	0-10
	Sangamonian	Glasford Fm.	Radnor Till M.	till, silt, sand, gravel	0-90
	Illinoian		Hulick Till M.		
			Kellerville Till M.		
	Yarmouthian	Banner Fm.		till, silt, sand, gravel	0-10
	Kansan				
PENNSYLVANIAN		Modesto Fm.		shale, sandstone, coal, limestone	70-250
		Carbondale Fm.	Danville(No.7)Coal M.		
			Brereton Limestone M.		
			Anna Shale M.		
			Herrin(No.6)Coal M.		
			Big Creek Shale M.		
			Canton Shale M.		
			St.David Limestone M.		
			Turner Mine Shale M.		
			Springfield(No.5)Coal M.		
			Colchester(No.2)Coal M.		

The regional stratigraphic framework is discussed in Section III A. Descriptions of geologic units in this section will be specific to the area in and around the petition area shown on Map 12. A discussion of the Pennsylvanian bedrock (from oldest to youngest) will focus on rock units starting just below the base of the Springfield Coal. This will be followed by descriptions of the glacial and other unconsolidated materials (refer to Figure III-2).

Pennsylvanian Strata

The near-surface Pennsylvanian rocks in the petition area are represented by two formations, the older Carbondale Formation and the overlying Modesto Formation. The combined maximum thickness of these two formations is about 250 feet, with most of this thickness represented by rocks of the Carbondale Formation. The Modesto Formation is limited to the central part of the petition area where the bedrock surface is relatively high. Map 13 shows the topography of the bedrock surface. In most of the petition area the bedrock surface has been eroded well into the Carbondale Formation.

Carbondale Formation - Rocks of the Carbondale Formation occur throughout a large portion of western Illinois and are the near-surface rocks in most of the petition area. The Colchester Coal Member marks the base of this formation and the top is bounded by the Danville Coal. Two feet of Colchester Coal was logged in a well drilled approximately four miles southwest of the petition area. In the petition area the depth to the top of the Colchester Coal is approximately 300 feet.

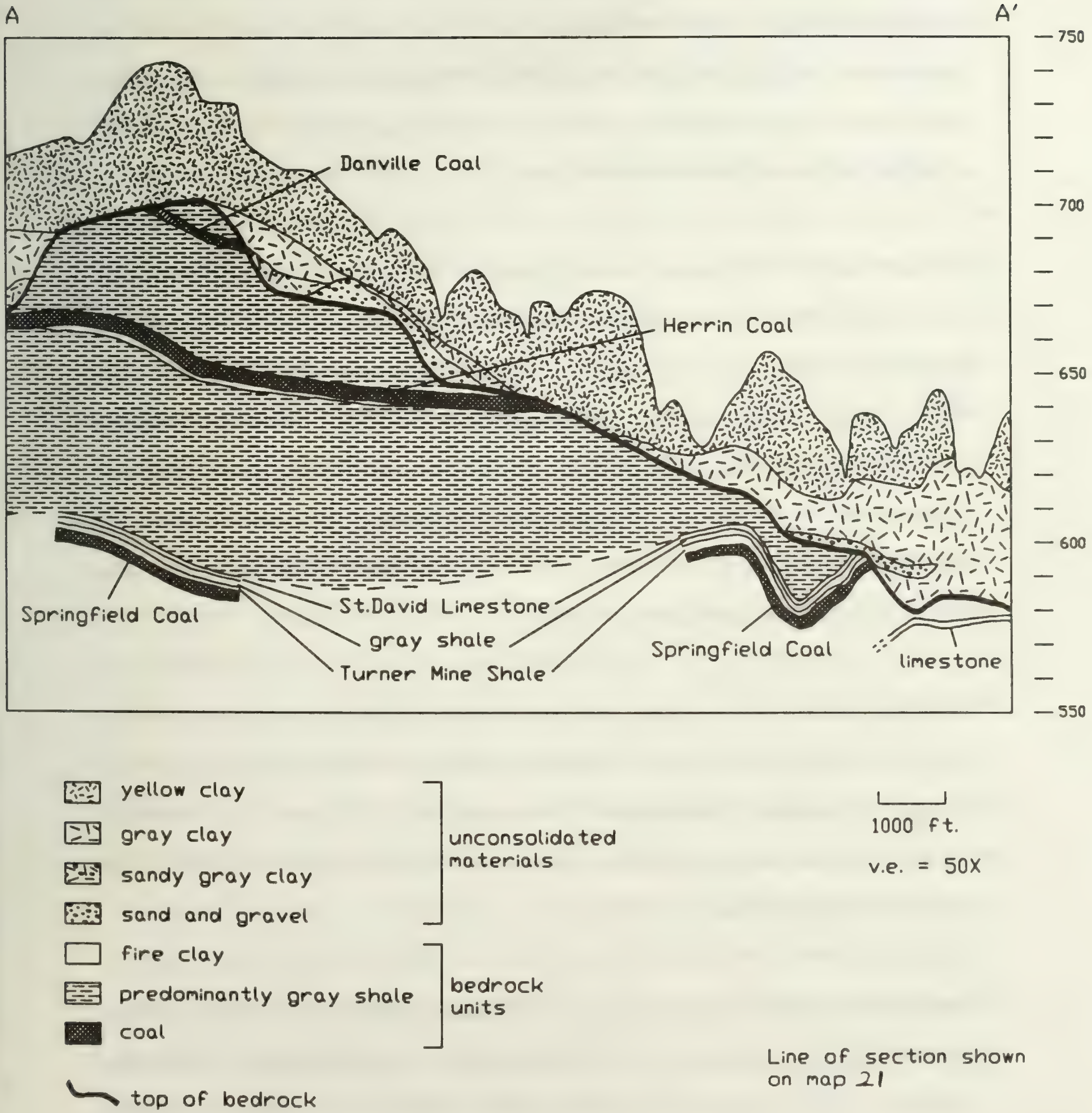
Two Carbondale Formation coal members have been mined in and adjacent to the petition area, the Springfield and the Herrin Coals. Although borings penetrating strata below the Springfield Coal are limited in the petition area, the materials between the top of the Colchester Coal and the base of the Springfield Coal are known to consist of approximately 100 to 150 feet of shales, thin limestones and sandstones. Two of these limestone units have been noted from well data at elevations of 575 and 588 feet in the northeastern part of a cross section of the petition area where the Springfield Coal is not present (Figure III-3).

The Springfield Coal is underlain by gray claystone (underclay) that is 1.0 to 2.0 feet thick. The Springfield has been recorded at depths of 50 to 150 feet and the elevation of the top of the coal is 590 to 605 feet. Its thickness ranges from 0 to 4.2 feet and averages about 3.7 feet (Map 14).

Overlying the Springfield Coal is a black shale, the Turner Mine Shale, that ranges from 1.0 to 2.4 feet thick. An unnamed thin dark gray shale, 0.5 - 2.5' thick, rests on the Turner Mine Shale and is overlain by the 0.5 to 1.3 feet of St. David Limestone, a dark gray, argillaceous limestone. These three units, the Turner Mine Shale, the dark gray shale, and the St. David Limestone, are widespread stratigraphic markers that are noted in nearly every petition area boring that penetrated the Springfield Coal.

FIGURE III-3

CROSS SECTION A - A'



The interval from above the St. David Limestone to just below the Herrin Coal (Figure III-3) largely consists of gray and dark gray shales. Some of this shale has been included in the Canton or the Big Creek Shale Members. Several limestone and sandstone units are noted in borings, but these units are usually thin and discontinuous and therefore, difficult to correlate throughout the petition area. Rapid lateral changes are characteristic of the gray shales and sandstones and these changes are responsible for local variations in thickness.

The distribution of the sandstone units is generally limited to the top of this interval, occurring closer to the Herrin Coal. One boring recorded a thickness of 29 feet of sandstone, but in most well records the sandstone thickness ranges from 5 to 12 feet. Where limestone is present, it is commonly 1 to 2 feet thick. These thin limestone units have been recorded throughout the interval between the St. David Limestone and the Herrin Coal. Beyond the area where the Herrin Coal is present (Map 15), rocks from this interval (usually shales) are the near-surface rocks in the petition area, overlain only by glacial and alluvial deposits.

Where the Herrin Coal is present, it is underlain by a claystone unit that is .5 to 1.5 feet thick. In the petition area, the thickness of the Herrin Coal ranges from 0 to 4.7 feet and has an average thickness of 4.1 feet (Map 15). The Herrin lies between 25 and 80 feet below the ground surface and the elevation of the top of the seam ranges from 645 to 680 feet above m.s.l. (Figure III-3).

Two distinct deposits are associated with the Herrin Coal; the 'blue band' and other material known as 'white top'. The blue band of the Herrin Coal is a prominent claystone parting. In the petition area, the blue band is 0.2 to 0.3 feet thick, gray to

bluish gray in color, and it occurs in the middle or lower part of the coal, usually 1.5 to 1.9 feet from the base of the seam. White top is a discontinuous deposit of light gray sandy clay, shale, or sandstone. As its name suggests, it locally replaces the top of the coal seam, but white top has also been noted at the base of the Herrin Coal. White top found on top of the coal is 0.3 to 1.4 feet thick. The few borings noting white top at the base of the coal recorded a thicknesses of about 2.4 feet.

The Herrin Coal is overlain by one of three units; the Anna Shale, an unnamed gray shale, or the Brereton Limestone. The Anna Shale is a black, hard, fissile shale that is 1.0 to 2.5 feet thick and generally lies directly over the Herrin Coal in the southern part of the petition area. Where the gray shale is present over the coal, it is 1.0 to 2.0 feet thick. The Brereton Limestone is a dark gray, fine grained limestone that commonly overlies the Anna Shale or the gray shale. Its thickness is usually 2.0 to 3.5 feet.

The interval between the top of the Herrin Coal and the bedrock surface ranges from less than 20 to as much as 60 feet. In addition to the three units that directly overlie the Herrin Coal, the remaining Carbondale Formation consists of gray and dark gray shales with some sandstone, limestone, and coal present. This interval is similar to that between the St. David Limestone and the Herrin Coal in that shale is the dominant lithology and the sandstones and limestones are discontinuous and usually thin. The sandstones are usually found at the top of the interval, occurring just below the bedrock surface. The thickness of the sandstone is commonly 2.0 to 3.0 feet, although records for a few borings in the petition area indicate thicknesses of 12 to 13 feet. Very thin sandstone units, less than 1.0 foot thick, are also present, usually interbedded with sandy shale. Individual bed thicknesses are not discernable and are described as 'shale and sandstone' on well records.

The Danville Coal occurs at the very top of the Carbondale Formation in the central and southern portions of the petition area where the bedrock surface attains its highest elevations (Map 13). The top of the Danville Coal has an elevation of 690 to 705 feet. In most of the petition area, the bedrock surface has been eroded into Carbondale Formation units well below the Danville Coal. Where it is present, the Danville Coal ranges from 1.0 to 3.0 feet thick and averages approximately 1.3 feet. Within the petition area, the extent of the coal is so limited that it is not considered a potential reserve. A thin claystone up to 1.0 foot thick occurs just below the Danville Coal.

Modesto Formation--The top of the Danville Coal marks the base of the Modesto Formation and all rocks above the Danville Coal belong to this formation. These rocks are only present in the central and southern portions of the petition area where the bedrock surface rises above elevations of 690 to 705 feet (Map 13). Rocks of the Modesto Formation consist mostly of gray shale, and these occur between the top of the Danville Coal and the bedrock surface. Where these rocks are present, their thickness ranges from less than 1.0 foot to approximately 25 feet. A thin limestone, 0.8 feet thick, was noted in the Modesto Formation in one petition area boring.

Surficial Deposits

Surficial deposits are those materials that occur at or near the ground surface. In the petition area, this includes naturally occurring alluvial and glacial deposits, and man-made deposits (spoil) from surface coal mining operations. With the exception of limited surficial bedrock exposures along West Fork Kickapoo Creek and its tributaries, the Pennsylvanian rocks of the petition area are overlain everywhere by

Quaternary (Ice Age) deposits or spoil. In the following discussion, these deposits are presented in order from oldest to youngest (see Figure III-2). The near-surface distribution of these materials is shown on Map 16 for the region and on Map 17 for the immediate vicinity of the petition area. Their thickness in the petition area is shown on Map 18.

Banner Formation and Older Glacial Deposits - The oldest and the lowermost glacial deposits of the region are included in the Banner Formation (Figure III-2). Although glaciers are known to have crossed the petition area depositing thick successions of glacial till to the west, no deposits of this age have been identified from well data available for this study. Within the petition area, Banner Formation deposits, which certainly were present in the past, have been largely removed by glacial erosion during episodes of the later Illinoian glaciation when ice moved over the area, extending as far west as the Mississippi River. If such deposits remain in the area, they probably consist mainly of thin weathered till deposits of restricted extent directly overlying the bedrock surface. Their preservation is most likely in low areas on the bedrock surface. Sand and gravel beds may be associated with these tills. Where they occur, the Banner deposits are usually intensely weathered in their upper part. The lower part of the till may be unweathered and contain carbonate minerals.

Glasford Formation - Deposits of the Illinoian glacial episodes are included in the Glasford Formation. The Glasford overlies the Banner, Modesto, or Carbondale Formations. It consists largely of loam-textured glacial till, but includes some gravel and sand beds and some overlying silt deposits. At least three glacial till members are present in the Glasford Formation of the region (Figure III-2).

The Kellerville Till Member, the lowermost unit of the Glasford Formation, is a silty, calcareous, glacial till containing abundant wood and local bedrock clasts. Locally, the unit has a soil developed in its upper part. The soil has not been recognized in the petition area and the Kellerville is not differentiable from later Illinoian till deposits in the petition area from the available data.

The Hulick Till Member of the Glasford Formation overlies the Kellerville and is one of the most widespread till units to the west of the petition area. The Hulick is a loam textured, illitic and kaolinitic, calcareous glacial till. It is gray in its unweathered state and weathers to yellowish brown in well-drained settings and grayish brown to olive under poorly drained conditions. The Hulick is distinguished from the underlying Kellerville by the presence of more illite and sand, than the Kellerville which contains more expandable clay minerals and is more silty. Both contain carbonate minerals, but the Hulick is slightly more dolomitic.

Like the Banner Formation, the older parts of the Glasford, the Kellerville and Hulick, probably were partially or completely removed by subsequent glacial and stream erosion.

The Radnor Till Member, the uppermost till unit of the Glasford Formation in the petition area, is a late Illinoian age deposit consisting of loam textured glacial till more highly illitic and more calcareous than the underlying Hulick. The glacier that deposited the Radnor Member, like that of the Hulick and Kellerville, flowed to western Illinois from the northeast via the Lake Michigan Basin. The Radnor ice advanced no further than a terminus in the petition area (Map 7 and silty and clayey till on Map 16). The limit of that glaciation is mapped along a north-south ridge that enters the petition area in Section 34, T-9-N, R-4-E (Map 12). Analyses of the well

data available for this study suggest that the ridge is a glacial end moraine in the southern part of the petition area, representing the thick accumulation of the ice-transported debris at a stationary glacial terminus (Map 18). The moraine, called the Oak Hill Moraine by Willman and Frye (1970), is comprised mostly of Radnor Till, which becomes thinner to the east and to the west of the ridge. In the northern part of the petition area, the ridge reflects the underlying bedrock topography and loses its morainic characteristics.

The Radnor Till Member, the thickest Quaternary deposit in the petition area, is a high illite (greater than 70%) till that is comprised of about 30 percent sand, 45 percent silt, and 25 percent clay. Where it is unweathered, it contains about 5 percent calcite and 20 percent dolomite in its combined clay, silt, and very fine sand fractions (Willman and Frye 1970).

Also included in the Glasford Formation are thin silt deposits and some discontinuous sand and gravel beds. Sands shown in the cross section of the petition area (Figure III-3) probably occur within the lower part of the Radnor Till and between the Radnor and underlying older Glasford deposits or bedrock. Some sand and gravel deposits may be associated with the older of the Illinoian glacial tills, however available data are not sufficient to map the distribution of these sands or to characterize their depositional history. It is clear from the available well data that thin, discontinuous sand deposits are present in the subsurface of the petition area and that these deposits are in some locations as much as 30 to 40 feet thick.

The upper part of the Glasford Formation contains the profile of the Sangamon Soil. This strongly weathered zone is a buried soil (paleosol) that represents surface weathering and soil formation during the warm climatic interval of the last

interglacial episode when the uppermost Glasford Formation deposits were at the ground surface. Pedogenesis (soil formation) in these deposits produced soil profiles whose most distinctive features are their high clay content, soil horizonation, reddish brown to gray color, and carbonate mineral depletion. The characteristics of these soil profiles are similar to modern soils in Illinois on glacial deposits younger than the Illinoian. The buried surface horizons of Sangamon Soil may also contain wood, peat, or humus, dramatic evidence of an ancient landscape buried by later geologic events.

The Glasford Formation, represented primarily by the Radnor Till Member, occurs throughout the upland region of the petition area and is exposed or found at shallow depths on the slopes of nearly every stream valley (thin loess over paleosol or till on Map 17). Where it occurs in the uplands, the Glasford ranges from about 20 to nearly 90 feet in thickness.

Peoria Loess and Roxana Silt - Wisconsinan age wind-deposited silt (loess) is included in the Peoria Loess and the underlying Roxana Silt. These deposits are usually comprised of more than 80 percent silt, with the remainder being mostly clay and only a small (usually less than 5%) sand fraction. Below the profile of the Modern Soil, the Peoria Loess may contain 20 to 30 percent calcium carbonate, whereas the Roxana is usually entirely leached of carbonates in this area. Their clay mineral composition is dominated by expandable clay minerals, usually 60 to 80 percent. The remainder is mostly illite with some kaolinite and chlorite.

The distribution of the combined Peoria Loess and Roxana Silt is shown on Map 17 as 'thick loess'. This loess unit is the surficial deposit over most of the upland area. It averages about 8 to 10 feet thick on level upland surfaces and is partially or

completely eroded on slopes. The loesses, which are easily eroded, are the principal natural source of sediment to streams in the area.

Cahokia Alluvium -- The Cahokia Alluvium includes stream-deposited sediments (alluvium) that have accumulated mostly during Holocene time, approximately the past 10,000 years. The alluvium is the least widespread Quaternary deposit in the petition area, occurring mostly along the West Fork Kickapoo Creek and its tributaries (Map 17). Within these valleys, the Cahokia is not differentiable into lithologic facies at the scale of Map 17. Nonetheless, a significant range of textural variation is present. Although the Cahokia may range from coarse gravel in point bar and channel deposits to silty and clayey overbank deposits, fine textured deposits predominate. These deposits can be either calcareous or leached of carbonate minerals. The Cahokia ranges up to about 20 feet thick in the valley of West Fork Kickapoo Creek, but seldom exceeds 10 feet elsewhere.

Surface Mine Spoil -- Deposits of previous surface coal mining operations are widespread in the petition area and its immediate vicinity (Map 17). These materials, largely the result of pre-law mining practices, consist of a mixture of Quaternary deposits and bedrock overburden from above the Herrin and/or Springfield Coal Members. The proportion of lithologies present in the deposits is probably similar to that present in analogous unmined portions of the petition area. In that case, glacial lithologies are dominated by glacial till and loess, whereas bedrock lithologies are mostly shale with lesser amounts of sandstone and limestone. The proportion of drift to rock in the spoil is a function of drift thickness and bedrock overburden thickness in the area prior to mining. These factors are not known. The distribution of drift and rock lithologies within the spoil materials depends on the mining techniques used and may vary significantly from place to place.

Geologic Structure

The Pennsylvanian rocks in western Illinois were deposited as relatively flat-lying beds. No faults are mapped in the area, but the geologic units have been subject to a variety of regional and local deformational processes. The rocks have been influenced by two mechanisms. First, tectonic subsidence of the Illinois Basin caused the rocks to tilt or dip to the east-southeast toward the deepest part of the basin. In western Illinois, Wanless (1957) noted a regional dip of 8 to 9 feet per mile toward the southeast on the base of the Pennsylvanian. Second, localized deformation from compaction occurred as sediments continued to be deposited on older rock units. Local folding of the rocks in the petition area is responsible for a 20 foot elevation difference over a horizontal distance of 1000 feet on the Springfield Coal and other rock units (Figure III-3).

Two geologic structures, the Elmwood Syncline and the Farmington Anticline, have been mapped in the vicinity of the petition area by Wanless (1957) as part of a series of anticlines and synclines in Fulton, Peoria, and Knox counties (Map 19). Anticlines are elongated folds with sides or limbs that slope downward away from the crest, and a syncline has opposite expression, a depressed axis with limbs that slope upward away from the axis.

Wanless (1957) noted a 70 foot difference (from north to south) on the top of the Springfield Coal between the two structures and drill hole data from the petition area support this observation.

Surficial Geologic Processes

Geologic processes of erosion and sedimentation are natural forces capable of modifying the landscape over time. The potential for erosive action depends on several factors, including: slope, precipitation, vegetative cover, and properties of the surficial materials. Steeper slopes, higher precipitation, reduced vegetative cover, and erodible materials tend to enhance erosion.

Man's activities can affect the rate at which these processes occur by modifying the factors that tend to enhance or retard the processes. Within the petition area, natural slopes range from low in most areas to moderate and steep along streams (Map 20). Elevations range from over 760 feet to below 600 feet above mean sea level (Map 12). The unmined soil materials are primarily silty, loess-derived, and particularly susceptible to erosion on steeper slopes.

Little land, if any, is in a 'natural state'. Most is cultivated, and much of the remainder has been disturbed and revegetated after previous surface mining. Mine spoil from past pre-law mining was generally left in slopes steeper than the natural slope, enhancing local erosion and sedimentation in the mined areas.

Future mining, if any, will disturb additional acreage, disrupting the preexisting natural and mining-modified slope, vegetation, and surficial materials. The extent and effects of future mining on erosion and sedimentation in the petition area cannot be assessed in the absence of a detailed mining and reclamation plan. However, the long-term trend might locally include both enhanced and decreased erosion depending on the nature of the land that is mined. One of the major requirements of the current reclamation regulations is intended to control erosion.

Non-Coal Mineral Resources

The non-coal geologic resources of the petition area are limited. Available data do not identify significant sand and gravel deposits that might be developed as an aggregate resource. Nor is there any indication that the area is underlain by commercial deposits of clay, limestone, or petroleum. No economic mineral deposits have been reported in this part of the state.

To the northeast of the petition area in the western part of Sec. 7, T-9-N, R-5-E and the eastern part of Sec. 12, T-9-N, R-4-E, sand and gravel has been commercially extracted since at least the 1930's. Its location is indicated on Maps 12 and 17. These deposits appear to be associated with an east-west trending glacial ridge that passes through Yates City and Elmwood to the east where other gravel pits have been worked. The ridge is an ice-contact feature similar to ridges on the Illinoian till plain in south-central Illinois. The sands within it are probably confined to the ridge form and constitute a local resource not extending into the petition area.

Other gravel pits are indicated on U. S. Geological Survey topographic maps along French Creek and the Spoon River a few miles to the northwest of the petition area.

Within the petition area, well data indicate that sand and gravel deposits are thin, discontinuous, dirty, and too deeply buried to be a viable source of aggregate. Available information suggests that they probably are poorly sorted, contain significant amounts of clay and silt, and lie beneath more than 20 feet of overburden.

Groundwater Aquifers

Communities and individual dwellings in the petition area rely principally on wells for drinking water. Data for the geological characterization of groundwater aquifers in the area come from all available water well, coal test, and highway boring records. The distribution of these data, including private, community, and non-community public water wells in the petition area and vicinity that are in the records of the State Geological and State Water Surveys are shown on Map 21. It is likely that these records are not complete. Every effort has been made to compile data from the files of these agencies, but experience has shown that a significant number of water wells in a given area may have been drilled without records being submitted to the Surveys. Additional data from Mid State Coal Co. borings was also evaluated.

Groundwater resources in the petition area and vicinity are developed from three principal sources, (1) shallow (less than 100 feet deep) sand and gravel deposits, (2) intermediate depth (120 - 675 feet) bedrock, including Mississippian and Pennsylvanian strata, and (3) deep (greater than 1,100 feet) bedrock, Ordovician strata. Table III-1 summarizes the data from available water well records in the petition area and vicinity shown on Map 21. By arrangement with the company, coal test borings from Mid State Coal are not shown.

Petition Area Water Wells -- Of the five water wells in the petition area, all are private wells; two are intermediate in depth, finished in Mississippian limestone at depths greater than 360 feet; the remainder are shallow, finished in sand and drift less than 80 feet deep.

TABLE III-1

WATER WELL COMPLETION INFORMATION FOR WELLS IN THE PETITION AREA AND VICINITY

Well-ID No.	Well Type	Total Depth	Aquifer	Depth of Water-Producing Interval
Petition Area				
667	Private	465'	Mississippian ls.	not reported
22054	Private	390'	Mississippian ls.	360' to 380'
22406	Private	55'	sand	35' to 36'
22639	Private	80'	sand	not reported
22640	Private	55'	drift	not reported
Surrounding Area				
602	Community	1580'	Galena/St. Peter	1114' to 1580'
830	Community	1700'	St. Peter Ss.	1570' to 1700'
833	Community	1572'	St. Peter Ss.	not reported
24126	NCP *	505'	limestone	not reported
581	Community	110'	sand	72' to 92'
665	Community	94'	sand	74' to 94'
829	Community	50'	gravel and sand	39' to 50'
582	Test hole	65'	dry hole	
666	Private	121'	Penn. rock	65' to 121'
23744	Private	677'	rock	532' to 676'
23944	Private	155'	coal	not reported
383	Private	30'	drift	not reported
1910	Private	21'	sand	15' to 16'
20942	Private	65'	sand	60' to 65'
22056	Private	68'	sand and drift	18' to 25'
22637	Private	90'	drift?	not reported
22638	Private	81'	drift?	not reported
23945	Private	34'	coarse sand	26' to 28'
23946	Private	54'	gravel	50' to 54'
23947	Private	43'	sand	28' to 30'
382	Private	not reported	not reported	not reported

* Non-Community Public

Surrounding Area Water Wells -- In the immediate vicinity of the petition area (Map 21), seven community and non-community public wells generally are finished deeper than private wells (Table III-1). Three are pumping from deep Ordovician bedrock at depths greater than 1114 feet. One is finished in limestone at about 500 feet, and three others are finished in sands between 39 and 94 feet deep. Three private wells in the vicinity are finished in Pennsylvanian or Mississippian rocks at depths of 65 to 676 feet, and nine private wells tap shallow sand and other drift deposits at depths of 15 to 65 feet. One private well has no reported total or aquifer depths.

Aquifers -- Within the 36 square mile area shown on Map 21, bedrock aquifers tend to be widespread and continuous. It is likely that wells drilled into the Mississippian or deeper bedrock anywhere in this area would find sufficient water for a private water supply. Deeper rock units (greater than about 1,100 feet) appear capable of supplying quantities of water sufficient for the small communities of Elmwood, Yates City, and Farmington, although each community has developed several wells to meet their needs. The mineral content of water from deep bedrock units may, however, limit the potential usage of the water.

Drift aquifers in the petition area and vicinity are more difficult to characterize. Data from over 500 coal test borings from Mid State Coal Co. in the petition area and vicinity indicate the presence of sand and gravel deposits in the drift. Because the well data are clustered and not uniformly spaced, the distribution of these sands cannot be mapped. It appears likely that these deposits have restricted extent, occurring in areas of a few hundred acres or less and separated laterally from adjacent sand bodies by hundreds to thousands of feet. Their thickness ranges from a few feet to as much as 30 to 40 feet, thinner sands being more common. Stratigraphically, they are probably Glasford Formation sands in or at the base of the Radnor Till

Member and at the contact of the oldest drift unit and bedrock. The local topographic setting and the distribution of the drift sands suggest that their groundwater recharge is from local infiltration through overlying and upslope drift deposits. Sand deposits that occur beneath the lower parts of the landscape near West Fork Kickapoo Creek may carry groundwater discharged from underlying rock units, water whose recharge zone is not identifiable from available information, but may be outside the petition area.

For a discussion of groundwater quality, refer to Chapter V of this report.

Coal Resources of the Site

The petition area has a long history of coal mining. In the past, both surface and underground mines have operated. Underground mining operations in the Springfield Coal began in the 1890's, and have all been abandoned. Surface mining began in the early 1930's. Several large surface-mined areas surround the petition area. The Herrin Coal has been extracted from Mid State's Rapatee Mine to the west and Midland's Elm Mine to the east (Map 22). Springfield Coal has been extracted from the Rapatee Mine in the northwest part of the petition area (Map 23). The Rapatee Mine is the only mine currently operating in Salem Township and is extracting the Springfield Coal from an area where the Herrin Coal has previously been removed.

Coal Thickness - In the Salem Township area, the Springfield Coal ranges from 3.0 to a maximum of 4.0 feet thick, averages about 3.7 feet thick, and contains no significant mineral partings or shales. (Map 14). The Springfield Coal has been removed by erosion in the northeast, surface mined in the northwest, and was mined

underground in the southern portion of the petition area. The Herrin Coal ranges from 2.5 to 4.7 feet thick and averages about 4.1 feet thick in the area (Map 15). The large thickness variation of the Herrin Coal is due to the presence of white top and clastic dikes. The Herrin Coal has been removed by erosion in the northern half of the petition area and has been mined extensively around the margins of the petition area.

Estimates of Resource, Reserve, and Recoverable Reserve - The coal resource is the total amount of coal present in the petition area regardless of whether it is minable. The coal reserve is the minable portion of the resource. The recoverable reserve is the reserve minus mining and cleaning losses. Estimated resources, reserves and recoverable reserves of the Springfield and Herrin Coals have been determined for unmined areas within the petition area from coal thickness data. In-place coal thickness values were derived from well data provided by Mid State Coal Company. The distribution of well data allows categorization of these estimates as "indicated" (all coal is within 3/4 mile of a drill hole) according to U.S. Geological Survey and U.S. Department of Energy classifications (Wood, Kehn, Carter, Culbertson, 1983). Estimates are summarized in Table III-2.

TABLE III-2

ESTIMATED RESOURCES, RESERVES, AND RECOVERABLE RESERVES
OF THE SPRINGFIELD AND HERRIN COALS IN THE PETITION AREA

Coal	Area (Acres)	Average Coal Thickness (Feet)	Tons/Acre-foot	Coal (Tons)
Springfield Coal				
Recoverable Reserve	5158	3.7	1272	24,279,178
Reserve	5158	3.7	1800	34,352,280
Resource	5158	3.7	1800	34,352.280
Herrin Coal				
Recoverable Reserve	1865	4.1	1170	8,946,405
Reserve	1865	4.1	1800	13,763,700
Resource	1915	4.1	1800	14,132,700

The reserve for the Springfield Coal is the entire area underlain by the Springfield. The reserve for the Herrin Coal excludes a narrow occurrence of coal north of the mined-out areas and south of the erosional limit of the Herrin (Map 15).

The coal resource in [illegible]ns in a give[illegible] coa[illegible] multiplying the thickness of clean coal in feet by the number of acres; an acre-foot of coal contains 1800 tons. This number is equivalent to the specific weight of clean coal 1.3 g/cm^3. Mid State Coal provided the actual recoverable reserve figures for the Elm and Rapatee mines for the last three years of operation. The Rapatee Mine has produced 1272 tons of clean coal per acre-foot of in-place Springfield Coal, and the Elm Mine has produced 1170 tons of clean coal per acre-foot of in-place Herrin Coal. These numbers are the best available for estimating the recoverable reserves of coal from the petition area. The difference between recoverable reserve estimates based on production figures of the coal mines and reserve estimates based on 1800

tons per acre-foot provides a best estimate of the percentages coal lost in mining and cleaning. These losses are 29 percent for the Springfield Coal, and 35 percent for the Herrin Coal. Larger mining and cleaning losses in the Herrin are probably due to the presence of white top, blue band impurities, and clastic dikes.

The Springfield Coal resource in the petition area total 34.35 million tons. The reserve is the same, as the resource the entire block is minable. After mining and cleaning are accounted for, the recoverable reserve (clean salable coal) that could be produced from the petition area is estimated to be 24.28 million tons.

The Herrin Coal resource in the petition area is estimated at 14.13 million tons. After excluding coal that has been isolated by previous mining, the Herrin reserve is estimated at 13.76 million tons. After mining and cleaning losses are accounted for, the recoverable reserve (clean salable coal) that could be produced from the petition area is estimated to be 8.95 million tons.

TABLE III-3

COAL QUALITY ANALYSES FOR COAL SAMPLES
FROM THE VICINITY OF THE PETITION AREA

Coal		Ash Percent	Sulfur Percent	Heating Value BTU/lb
Springfield Coal - Rapatee Mine*				
	As Received	10.61	2.53	10,505
	Dry	12.75	3.05	12,580
Herrin Coal - Elm Mine**				
	As Received	9.00	3.00	10,687
	Dry	10.70	3.06	12,708

*Source: Mid State Coal Co.
**Source: Illinois State Geological Survey Coal Information System

Sulfur Content - The quality of the Springfield and Herrin Coals in the petition area is typical of these coals as they occur elsewhere. Both are high sulfur coals, which by conventional definition, are coals containing more than about 1 percent sulfur by weight (dry). However, Illinois coal with less than about 2.5 percent sulfur is commonly referred to as "relatively low sulfur coal." Sulfur in coal occurs as pyritic sulfur and organic sulfur. Pyritic sulfur occurs in the form of pyrite nodules, lenses, and cleat fillings, as well as fine-grained particles scattered throughout the coal. Organic sulfur is dispersed in the organic materials that comprise the coal. Clean coal from the Rapatee Mines has an average sulfur content of 2.53 percent (3.05%, dry) for the Springfield Coal over last two years of operation (Table III-3). Analyses of the total sulfur of clean coal from the Elm Mine show a content of 3.00 percent (3.06% dry) for the Herrin Coal. The values for the Herrin Coal are an average of five samples from the Elm Mine retrieved from the Illinois State Geological Survey Coal Information System. (Table III-3)

Based on these average sulfur contents, the potential sulfur dioxide emissions from burning coal produced from the petition area are estimated to range from 4.84 to 5.67 pounds per million British thermal units (lb/MBtu).

Heating Value - Average heat values in this section (Table III-3) are given on a moist mineral-matter free basis. A heat value of 12,580 Btu/lb for the Springfield Coal is based on clean salable coal from the Rapatee Mine for 1988 and 1989. The 12,708 Btu/lb value for the Herrin Coal was taken from the Elm Mine data retrieved from the Illinois State Geological Survey Coal Information System.

Rank - The American Society for Testing and Materials (ASTM) coal rank of the Springfield and Herrin Coals in the petition area is high-volatile C bituminous. All of the surface minable coal reserves in western Illinois are high volatile C bituminous in rank.

Overburden - An important factor in the evaluation of a coal resource is the amount of overburden that can be removed economically in a surface mining operation. This amount depends largely on the thickness of the coal seam. A ratio of overburden thickness to coal seam thickness that is larger than 30:1 may, in many cases, be beyond the limits of economic recoverability by surface mining. This is only a generalization and depends also on other factors, such as overburden composition and coal quality. The average mining ratio in Illinois is about 15:1. For Salem Township, the ratio of overburden to coal thickness for the Herrin Coal ranges from 10:1 to 15:1, that is about 40 to 60 feet of overburden above an average 4.1 foot thick coal. This is a favorable surface mining ratio. The ratio of overburden for the

Springfield Coal ranges from 22:1 to 27:1, that is about 60 to 80 feet of overburden above a 3.7 foot thick coal. This is not as favorable a surface mining ratio, however removal of two seams significantly alters the economics of the mining. The combined ratio for both seams is 13:1 to 18:1 that is about 100 to 140 feet of overburden for 7.8 feet of coal. The combined surface mining ratio is slightly above the average for Illinois.

The effect that the overburden has on a mining operation depends on several factors. These include its ease of excavation, stability of the highwall, and water-yield from the overburden to the mine pit. The overburden in a mine in the petition area would be mostly shale and glacial till. These materials should be relatively easy to excavate. The few limestone and sandstone beds present are generally thin and will not require excessive blasting. This region of Illinois has been successfully surface mined for many years.

CHAPTER IV

ATMOSPHERIC RESOURCES

A. CLIMATOLOGY OF KNOX COUNTY, ILLINOIS

General Comments

Knox County experiences a mid-latitude, continental climate, i.e., cold, dry winters and warm to hot, moist summers, with maximum precipitation occurring during the warmer half-year. Snow accounts for about 40 percent of winter's (water equivalent) precipitation, although there is great variability from year to year (the winters of 1977-1978 and 1989-1990 are cases in point).

Knox County lies in a region between a region to the north where severe, cold winters are frequent, and a region to the south that has frequent hot summers. Therefore any one year in central Illinois may have an extreme winter or summer. The summers of 1936 and 1988 come immediately to mind, as do the winters of the late 1970s. Some summers experience much severe weather (hail and tornadoes), whereas in others the weather is much more docile. Similarly, some winters are renowned for more frequent and more severe winter storms.

Three different air masses impact Knox County during the year. In summer, maritime tropical air from the Gulf of Mexico dominates. Daytime temperatures are in the range of 80 to 90° F, with daytime humidity of 65 to 75 percent. About a quarter to a third of summer days experience cumulus and/or cumulonimbus clouds, with showers and thunderstorms.

Arctic and Pacific air dominate Knox County during winter. The coldest days occur with arctic air masses from Canada. Temperatures of 0° F or less are common with

arctic air, which is the driest of any air mass and generally brings no precipitation. Milder winter days and most days of spring and fall are dominated by Pacific air, with daytime temperatures of 50 to 80° F. Pacific air is relatively dry, having lost most of its moisture on the western slopes of the Rockies.

Temperatures

Maximum temperatures in July are usually in the mid-80s, while those of January are near 30° F. Daily minima are about 20° F lower. The highest temperature on record within Knox County is about 105° F, while the lowest is - 22° F. Maximum temperatures in April and October are in the mid to low 60s. The greatest day-to-day temperature variation is noted in winter with the passage of strong cold fronts. Maximum daily temperatures exceed 90° F about 25 days each year, and minima are less than 0° F about 10 days each year.

Ground frost typically "invades" Knox County in late December and generally continues until late February/early March. Frost depth usually penetrates to 24 inches, although frost has been observed to 3 feet.

Precipitation

Average annual precipitation is about 36 inches, but varies from about 24 to as much as 50 inches. About 65 percent of the annual precipitation falls from April through September. About 28 inches of snow falls annually, again with great variation, from as much as 50 inches (1977-1978 and 1978-1979) to as little as 6.2 inches (during calendar year 1966).

Extremely heavy rain showers can occur in the Knox County area. According to data from the Illinois State Water Survey, 24-hour precipitation will be at least 6.8 inches once each 50 years, and 8.0 inches once each 100 years. One-hour precipitation is expected to exceed 2.7 inches once each 50 years and 3.8 inches once each 100 years.

Humidity

Nighttime relative humidities are relatively constant throughout the year, being between about 70 and 90 percent, on average. Relative humidities typically fall about 10 percent during winter daylight hours, and from 15 to 25 percent during summer days.

Winds

January winds are generally out of the west through the northwest (about 35% of the time), with the next most frequent direction being east or southeast (about 15%, most often prior to a major winter storm). Wind speeds average 10 to 20 miles per hour (mph) during all seasons (except spring, when they are slightly higher), during the day and calm to 10 mph at night.

Severe Weather

Thunderstorms occur on about 40 days per year in this area, primarily during the warmer months of the year. Most of them are restricted to lightning, thunder, light

to moderate rainfall for 10 to 20 minutes, and winds to perhaps 25 mph; however, on a few days each year, any one location in the county may experience a severe thunderstorm. These thunderstorms, though restricted to areas of only a few tens of square miles, produce hail, winds to perhaps 60 mph, heavy precipitation, and occasionally a tornado. Some 30 tornadoes are reported within the state each year, again with great variability. Each tornado typically impacts an area bounded by only a few hundred yards across and 20 to 30 miles long, so the chance that a particular location will be impacted is small. Tornado frequencies in Knox County indicate a local maximum, i.e., slightly higher than surrounding counties, but this may be due to greater population in the county. (Greater numbers of people increase the probability that a tornado will be seen).

Illinois experiences about five severe winter storms (6 inches or more snow and/or freezing precipitation) per year. There have been as few as two, and as many as 18. These storms usually impact an area about 250 miles east-west and 50 miles north-south; therefore any one location in Illinois may miss such a storm.

Thick fog, with visibilities less than 1/4 mile, is primarily a cold-season phenomenon, averaging about 20 days per year.

B. AIR QUALITY

Illinois has set air quality standards for six air pollutants: total suspended particulate matter (TSP), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), and lead (Pb). The state monitors atmospheric concentrations of these pollutants at many locations. The only one of these pollutants likely to be affected by surface mining operations is TSP. Table IV-1 shows the current status of TSP concentrations in the vicinity of the Knox County site, which were obtained from measurements made at monitoring stations at Galesburg, Peoria, Quincy, and Petersburg. This table shows annual geometric mean concentrations for 1982-1988 at sites judged to be generally nonurban. The values range from 37 to 54 $\mu g/m^3$. None of these sites exceeded either the primary or secondary standards for annual geometric mean TSP concentrations (75 and 60 $\mu g/m^3$, respectively). Note that year-to-year variations in annual geometric mean TSP concentrations are typically not more than 3 to 4 $\mu g/m^3$ at these sites. Similar uniformity is expected at the Knox County site in question.

Although concentrations of other (non-TSP) pollutants are not expected to be affected by surface-mining activities, summaries of all pollutant measurements made at Illinois sites in the Burlington-Keokuk Interstate Air Quality Control Region (AQCR 65, the Region in which Knox County is located) are presented below. Locations of the sampling sites are shown in Map 26 and in more detail in Map 27.

Additional details on TSP measurements are shown in Table IV-2. The Galesburg site, with only 27 samples during 1988, did not meet the statistical selection criterion of at least 45 samples; thus its annual geometric mean was not reported. However,

none of the Galesburg samples exceeded either the primary or secondary standards for 24-hour samples (260 and 150 $\mu g/m^3$, respectively).

TABLE IV-1

ANNUAL GEOMETRIC MEAN OF AIRBORNE TOTAL SUSPENDED PARTICULATE MATTER
(micrograms per cubic meter)

AT FOUR SITES IN WEST-CENTRAL ILLINOIS
1982 THROUGH 1988

Site	1988	1987	1986	1985	1984	1983	1982
Galesburg	+	44	40	43	43	46	48
Peoria*	-	40	38	40	37	44	42
Quincy	50	48	44	46	+	50	49
Petersburg	-	-	-	42	41	54	48

+ Data did not meet the minimum statistical selection criteria.
- Station did not operate during this year.
* Station location: 1604 Detweiller St.

TABLE IV-2

1988 TOTAL SUSPENDED PARTICULATES
(micrograms per cubic meter)

65 BURLINGTON-KEOKUK INTERSTATE (IA - IL)

Station	Number of samples Total	>150 $\mu g/m^3$	>260 $\mu g/m^3$	Highest samples 1st	2nd	3rd	4th	Annual statistics Geo. mean	Std.geo. deviation
KNOX COUNTY									
Galesburg 40 E. Simmons	27	0	0	95	82	77	66	+	
PEORIA COUNTY									
Peoria 613 N.E. Jefferson	57	0	0	136	133	124	117	53	1.6
TAZEWELL COUNTY									
East Peoria 235 E. Washington	57	0	0	138	126	122	112	57	1.5
Pekin 531 Court	58	0	0	115	110	102	100	49	1.5

None of the other three sites in AQCR 65 exceeded either the primary or secondary standards for either the 24-hour concentration or the annual geometric mean concentration.

Lead

Results for lead are shown in Table IV-3. Only one Illinois site (613 N.E. Jefferson, Peoria) in AQCR 65 measured lead during 1988. The highest quarterly average concentration was 0.03 $\mu g/m^3$ during the fourth quarter. Thus this site was in compliance with both the primary and secondary standards for Pb, which are both 1.5 $\mu g/m^3$, as the quarterly arithmetic mean.

TABLE IV-3

1988 LEAD
(micrograms per cubic meters)

65 BURLINGTON-KEOKUK INTERSTATE (IA - IL)

Station	Number of quarters ≥ 1.5	Quarterly averages 1st	2nd	3rd	4th	Annual mean
PEORIA COUNTY						
Peoria 613 N. Jefferson	0	0.02	0.02	0.02	0.03	0.02

Sulfur Dioxide

Sulfur dioxide was measured at two sites in AQCR 65 during 1988. Results are shown in Table IV-4. Both sites recorded annual arithmetic mean concentrations of 0.008 parts per million (ppm) and thus met the primary standard for the annual arithmetic mean (0.03 ppm). The highest single 24-hour average concentration at the Pekin site was 0.158 ppm; on this one occasion the corresponding standard of 0.14 ppm was exceeded. The highest 3-hour average concentration was 0.288 ppm, also at the Pekin site, so both sites were in compliance with the 3-hour standard of 0.5 ppm.

TABLE IV-4

1988 SULFUR DIOXIDE
(parts per million)

65 BURLINGTON-KEOKUK INTERSTATE (IA - IL)

		Number of samples		Highest samples				Annual statistics	
		3-hr	24-hr	3-hr avg.		24-hr avg.		Arith.	Std. geo.
Station	Total	>0.5	>0.14	1st	2nd	1st	2nd	mean	deviation
PEORIA COUNTY									
Peoria Hurlburt & MacArthur	8301	0	0	0.177	0.165	0.074	0.068	0.008	3.20
TAZEWELL COUNTY									
Pekin 272 Derby	8467	0	1	0.288	0.269	0.158	0.076	0.008	3.14

Ozone

Ozone was measured at two sites in AQCR 65 during 1988. Results are shown in Table IV-5. Neither site recorded any days having a 1-hour average reading above the standard of 0.12 ppm.

TABLE IV-5

1988 OZONE
(parts per million)

65 BURLINGTON-KEOKUK INTERSTATE (IA - IL)

Station	No. of samples Apr-Oct	Number of days greater+ than 0.12 ppm Actual	Expected	Highest samples annual 1st	2nd	3rd	4th
PEORIA COUNTY							
Peoria Hurlburt & MacArthur	4918	0	0.00	0.123	0.109	0.101	0.095
Peoria Heights 508 E. Glen	5077	0	0.00	0.108	0.103	0.102	0.102

Carbon Monoxide

Only one site in AQCR 65 measured CO in 1988 (see Table IV-6). The highest recorded 1-hour and 8-hour average concentrations were 15 and 8.8 ppm, respectively. The site was thus in compliance with both the 1-hour standard of 35 ppm and the 8-hour standard of 9 ppm.

TABLE IV-6

1988 CARBON MONOXIDE

65 BURLINGTON-KEOKUK INTERSTATE (IA - IL)

	Number of quarters			Highest samples (ppm)					
				1-hour averages			8-hour averages		
Station	Total	≥35 ppm	≥9 ppm	1st	2nd	3rd	1st	2nd	3rd
PEORIA COUNTY									
Peoria 1005 N. University	8291	0	0	15.0	13.1	11.6	8.8	7.9	6.4

Nitrogen Dioxide, Non-Methane Hydrocarbons

No measurements of these pollutants were made in the Illinois portion of AQCR 65 in 1988.

CHAPTER V

WATER RESOURCES

A. GROUNDWATER HYDROLOGY

Groundwater Flow System

The term groundwater is usually reserved for the subsurface water that occurs beneath the water table (the surface in an unconfined water body where the pressure is atmospheric) in soils and geologic materials that are fully saturated (Freeze et al. 1979). Groundwater is only one variable involved in the hydrologic cycle. It beings as precipitation that seeps downward into the ground through the soils. A portion of it will be reintroduced into the atmosphere through the evapotranspiration of plants and/or evaporation by natural environmental processes. Another portion will be transmitted down through unsaturated zones to the water table, producing recharge to geologic materials. Recharge is defined as the addition of water to a zone of saturation which involves the vertical movement of water through geologic deposits. This is important in terms of groundwater availability and patterns of flow to both the unconsolidated materials and deeper deposits.

Figure V-1 shows the generalized cycle of water movement. Water falls from the atmosphere as precipitation to the ground surface, then moves from the surface either through the ground or as runoff into flowing streams, and again moves into the atmosphere through evaporation and transpiration. These are the basic principles involved in the flow of groundwater at or near the surface of the earth. This portion of the report discusses these natural premining flow principles of both the shallow unconsolidated and the bedrock aquifer environments within the petition area.

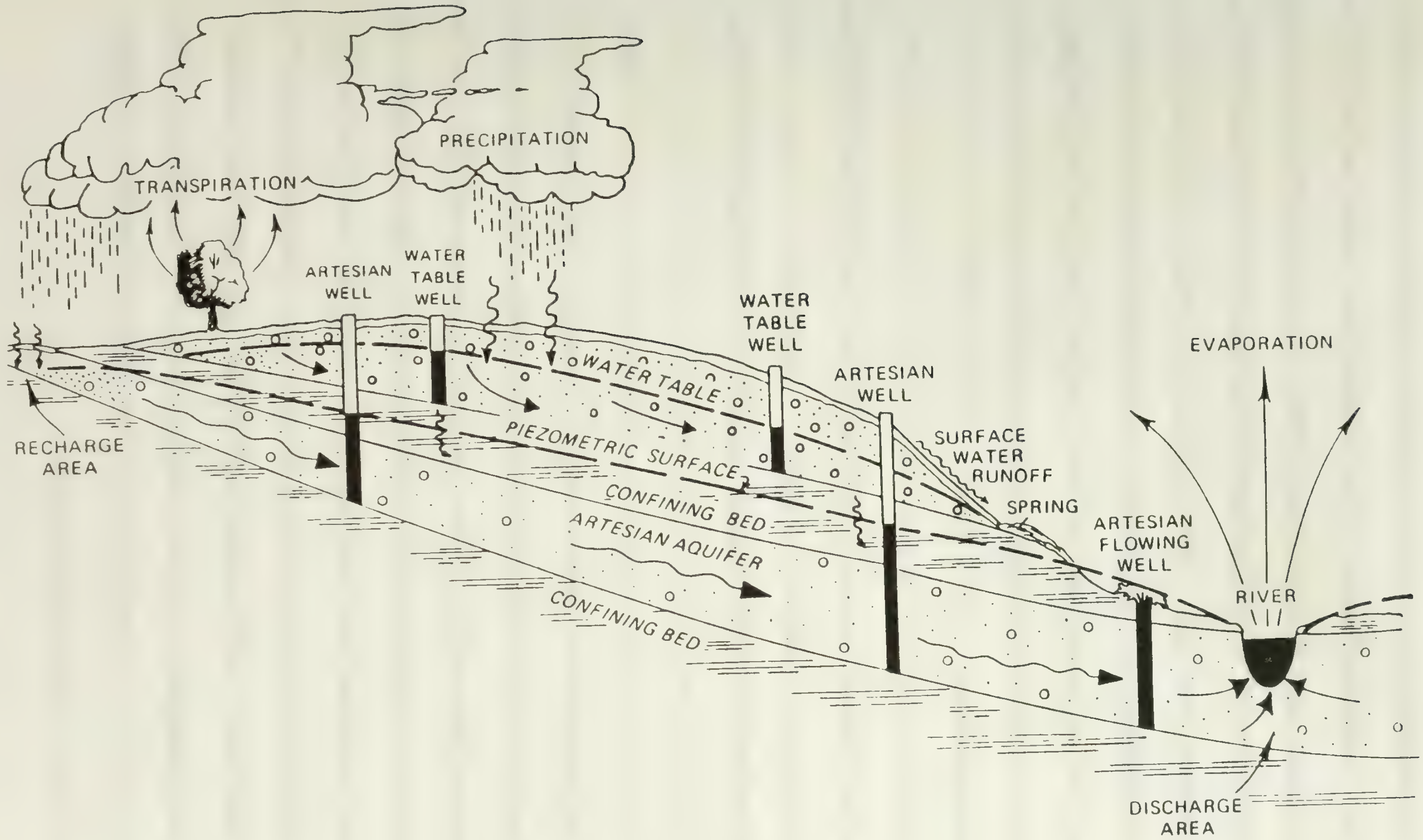


FIGURE V-1

GENERALIZED WATER CYCLE

Available information indicates that there are several natural hydrologic features which would influence shallow flow regimes at the site. Two local recharge areas are evident from the topographic maps. These high-elevation points, located in the south-central and south portions of the site (T-9-N, R-4-E, Sections 27 and 34 Knox Co., respectively), will act as recharge areas where radial flow will occur in the downgradient direction. Discharge will be into the local streams and/or ponds which were created by natural features or past mining (as evidenced by topographic maps). On the east edge of the petition site, the West Fork of Kickapoo Creek influences flow directions toward it. This natural hydrologic feature acts as a local discharge point for shallow groundwater.

The central and northwestern portions of the petition area will respond to the local water movement regime mentioned previously. Flow within these areas will be toward natural depressions, creeks, and/or ponds, or toward those left from past mining.

The natural flow patterns within the bedrock of this area are related to the slope of those units. The base of the uppermost bedrock unit, the Pennsylvanian bedrock, has a gentle easterly dip (Wanless 1957). Flow directions of groundwater within this unit will likely be in this direction. The deeper bedrock units, Ordovician and Silurian-Devonian formations have a regional southeastern dip with local variations (Student et al. 1981). Normal flows will follow this slope within these units. The velocities of flow within each formation will depend upon either the amount of cementation of the sandstone units or the interconnection of the crevices and solution channels within the limestone units. (For a more detailed description of geologic features, see the Chapter III section of this report).

A human-induced factor which will influence local flow directions in both the unconsolidated and bedrock units of this area will be pumpage of water wells for private and public use. The determining factor in the extent of influence will be the type of well and amount of water withdrawn from that well. Two types of wells are used in this area which may influence local flow patterns. Large-diameter bored wells and small-diameter drilled wells finished within the unconsolidated materials and bedrock formations, respectively, are in use in and around the petition area (see Appendices B and C). The bored wells tap stringers or lenses of silt, sand, or gravel only a few inches thick contained in the unconsolidated materials above bedrock. The water levels fluctuate seasonally in response to variations in precipitation. The total water withdrawal from these wells is estimated to be less than 10,000 gallons per day (gpd) in and around the petition area.

Small-diameter drilled wells tap the underlying bedrock formations and are used for private industrial, domestic, and municipal water supplies in this area. The shallow bedrock wells (ranging from 282 to 465 feet in depth) are used for domestic and industrial water wells. The total estimated water withdrawal for these (domestic and industrial) systems is approximately 10,000 gpd. This figure is based upon the sum of the number of wells supplying an average of three people per home using an average of 70 gallons per person per day. These wells are cased through formations which do not yield sufficient quantities or qualities of water. An open borehole through the water-yielding formations allows pumpage for various uses. These types of systems will alter the natural flow patterns within the bedrock; however, the amount of influence will depend upon the specific water-yielding capabilities of the formation the borehole penetrates and the pumpage rate.

Small-diameter drilled wells finished within the deep Ordovician formations are also used in the areas surrounding the petition site. These wells range in depth from 1498 to 1743 feet and are used for municipal groundwater supplies. No municipal wells lie within the petition area; however, the amount of pumpage from these wells can influence the local flow patterns within these units. Information from the Illinois Water Inventory Program for 1988 indicates that total pumpage from the wells at Elmwood, Farmington, and Yates City is approximately 550,000 gpd. These wells provide the greatest amount of groundwater to the largest amount of individuals in the petition area. The amount of influence each municipal well will have on flow conditions will depend upon the city's water demand and on the hydraulic characteristics of the formations tapped by the well.

Summary

As indicated, the deeper Ordovician bedrock formations provide the greatest amount of water to the largest number of people in this area. The shallow bedrock (less than 500 feet) and unconsolidated materials above bedrock are the main source for domestic water supplies in and around the petition area which are not serviced by municipal supplies. The flow regime for the unconsolidated materials will typically follow local flow schemes (i.e., downgradient flows discharging into water bodies). The natural flow regimes associated with the bedrock units in this area will be influenced by the inherent sloping characteristics and the physical properties of the materials which retain the groundwater. These natural flow characteristics will be affected by the local water-well conditions at the site. The local water-well use will tend to induce movement toward the well (or wells); however, the extent of this influence can be determined only by hydrologic testing. This testing would allow calculations of the physical properties of the well and formation, which in turn would

allow estimates of influence based upon those properties. For a detailed discussion of the impact surface mining may have on these natural parameters, see Chapter XID Changes in Groundwater Flow Patterns. Further information can be derived from groundwater publications, Appendix D.

B. SURFACE WATER SYSTEM

General Description of the Surface Water System in the Area

The petition area is located in the upland prairie that lies between the Spoon River and Kickapoo Creek watersheds in southeastern Knox County. Five streams drain the petition area: 1) West Fork Kickapoo Creek; 2) a tributary to French Creek; 3) Hickory Creek; 4) a tributary to Littlers Creek; and 5) Flea Creek. The locations of these streams and their watersheds, relative to the petition area, are shown in Map 28. The largest of these streams, West Fork Kickapoo Creek, flows to the east, draining 57 percent of the petition area. The other four streams all drain toward the west to the Spoon River.

Watershed Characteristics

The sizes of the watersheds in the petition area are listed in Table V-1. With the exception of West Fork Kickapoo Creek, all the streams have drainage areas less than 2.2 square miles. These smaller tributaries flow through the upland areas without well-defined valleys. Pastures and fields generally extend at a mild slope to the bank of the channel. The elevation of the upland area through which the streams flow varies between 640 and 760 feet msl.

West Fork Kickapoo Creek is the only stream in the petition area that has a well-defined valley. The valley of West Fork Kickapoo Creek is incised approximately 40 feet into the upland area, and has an elevation through the study area of 600 to 630 feet msl. The width of its valley ranges from less than 400 feet up to 1,000 feet. The length of West Fork Kickapoo Creek lying in the study area is 2.6 miles (river miles 14.5 to 17.1). The drainage area of West Fork Kickapoo Creek is 12.7 square miles at the upstream end of the petition area, and increases to 19.1 square miles immediately downstream of the petition area.

TABLE V-1

WATERSHED AND STREAM CHARACTERISTICS

	Drainage area (mi2)	Watershed range in elevations (feet-msl)	Length of channel (miles)	Stream slope (ft/mi)
West Fork Kickapoo Creek (within petition area)	19.1 (5.71)	598-760	8.0 (2.6)	10
Tributary to French Creek	2.16	615-710	2.0	20
Hickory Creek	1.24	620-740	1.0	40
Tributary to Littlers Creek	0.94	700-760	0.5	>50
Flea Creek (no defined channel)	0.02	730-740	---	---

Soil Type and Land Cover

The soils associated with the petition area are predominantly Tama-Muscatine-Ipava soils. Soils along the valleys of the streams are Hickory and Clinton soils. The

uplands have typical slopes of 2 percent to 4 percent. The soils have only a slight potential for erosivity. Slopes near the larger streams may be as great as 30 percent and provide a moderate potential for erosivity. The predominant land covers are cropland and pasture. Approximately 25 percent of the petition area has been surfaced-mined; the land cover in these areas is pasture/brushland and water bodies. A detailed description of the soils and land use is reported in Chapter VI (Soil Resources).

Infiltration and Drainage

The infiltration rate of soils in the petition area is considered to range from moderate (0.6 to 2.0 inches per hour) to moderately slow (0.2 to 0.6 inches per hour). The soils are moderately to moderately-well drained. These infiltration and drainage characteristics are typical of soils throughout western and central Illinois.

Stream Characteristics

Channel Geometry

The channel of West Fork Kickapoo Creek typically is 20 to 25 feet wide and 5 to 10 feet deep, and has steep banks. The smaller tributaries are typically 5 to 10 feet wide and 2 to 3 feet deep, again with steep banks. These values were obtained through field reconnaissance of the petition area, and they are in basic agreement with values given by Roseboom et al. (1982) for similar-sized creeks in central Knox County.

Stream Slope

The slopes of the streambeds were estimated by using topographic maps. The streambed elevation of West Fork Kickapoo Creek in the petition area varies from 598 feet msl at the downstream (northeast) side to 623 feet at the upstream side, for an average channel slope of approximately 10 feet per mile. The stream slopes for other tributaries draining the area range from 20 feet per mile to more than 50 feet per mile. Typically the stream slope increases as the size of the tributary decreases.

Sinuosity

Sinuosity is the ratio of the distance along the stream channel to the straight-line distance along the centerline of a stream valley. The sinuosity of the streams in the petition area is relatively low, varying from 1.05 to 1.20. This relatively low sinuosity indicates fairly straight stream channels, and is similar to the sinuosity of other upland streams in Illinois that have small watershed areas.

<u>Streamflow</u>

USGS Streamflow Data

There is no gaging on the streams which drain the petition area. However, nine locations in the Spoon River and Kickapoo Creek watersheds currently have or previously have had continuous recording gages. The names of these gaging stations, their periods of record, and their watershed areas are listed in Table V-2. The locations of these streamgaging stations are shown in Map 29.

TABLE V-2

USGS STREAM GAGES NEAR THE PETITION AREA

USGS Gage number	Name of gage	Drainage area (mi^2)	Period of record
05563000	Kickapoo Creek at Kickapoo	119	1944-1962
05563500	Kickapoo Creek (Peoria)	297	1942-1971
05568800	Indian Creek (Wyoming)	62.7	1959-1989
05569500	Spoon River (London Mills)	1072	1942-1989
05570000	Spoon River (Seville)	1636	1914-1989
05570350	Big Creek (St David)	28.0	1972-1985
05570360	Evelyn Branch (Bryant)	5.9	1972-1989
05570370	Big Creek (Bryant)	41.2	1972-1989
05570380	Slug Run (Bryant)	7.1	1975-1989

Selection of Streamflow Records for Use in Analysis

The gaging records for three stations were selected as being most representative of conditions in the petition area. These three stations are Indian Creek near Wyoming, Big Creek near Bryant, and Evelyn Branch near Bryant. Criteria used for gage selection are 1) drainage area of the stream, and 2) coincident records (1971-1988). The gaging records for Big Creek and Evelyn Branch are particularly applicable to the petition area, because these streams drain areas that have been surface-mined. The Indian Creek watershed has not been mined.

The amount of flow in these streams is roughly proportional to the stream's contributing drainage area. In dividing the flows recorded at these gaging stations by the stream's contributing drainage area, flows from these stations become

comparable. The resulting flow values, given in cfs/mi^2 (cubic feet per second per square mile), may be applied to streams in the petition area.

Average Streamflow and Seasonal Distribution

The average flow at the three selected stream gages is very similar, ranging from 0.85 cfs/mi2 to 0.92 cfs/mi^2, with an average of 0.88 cfs/mi^2. The average flow at most watersheds, of this size, in the region will be approximately the same. This average flow for a particular stream can be estimated by multiplying 0.88 by the drainage area of the stream. For example, the average flow for the West Fork of Kickapoo Creek -- with a drainage area of 19.1 mi^2 -- is 19.1 x 0.88 = 16.8 cfs (cubic feet per second).

The seasonal distribution of average streamflow is shown for each gaging station in Figure V-2. All the streams exhibit the same seasonal pattern, ranging from a high monthly average of 1.7 cfs/mi^2 in April, to a low monthly average of 0.3 cfs/mi^2 in September. Indian Creek exhibits lower streamflow in late summer and fall than do Evelyn Branch and Big Creek. The lower summer flows shown for Indian Creek are more representative of flow conditions for undisturbed watersheds.

Flow Duration

A flow-duration relationship defines the percentage chance that various levels of daily streamflow may be exceeded over a number of years. This relationship is provided for the three gaging stations in Figure V-3. The distribution of flow among the three streams is fairly similar. However, the two streams draining surface-mined areas (Big Creek and Evelyn Branch) have a greater amount of flow during dry periods. This suggests that these watersheds contain a greater amount of sustainable

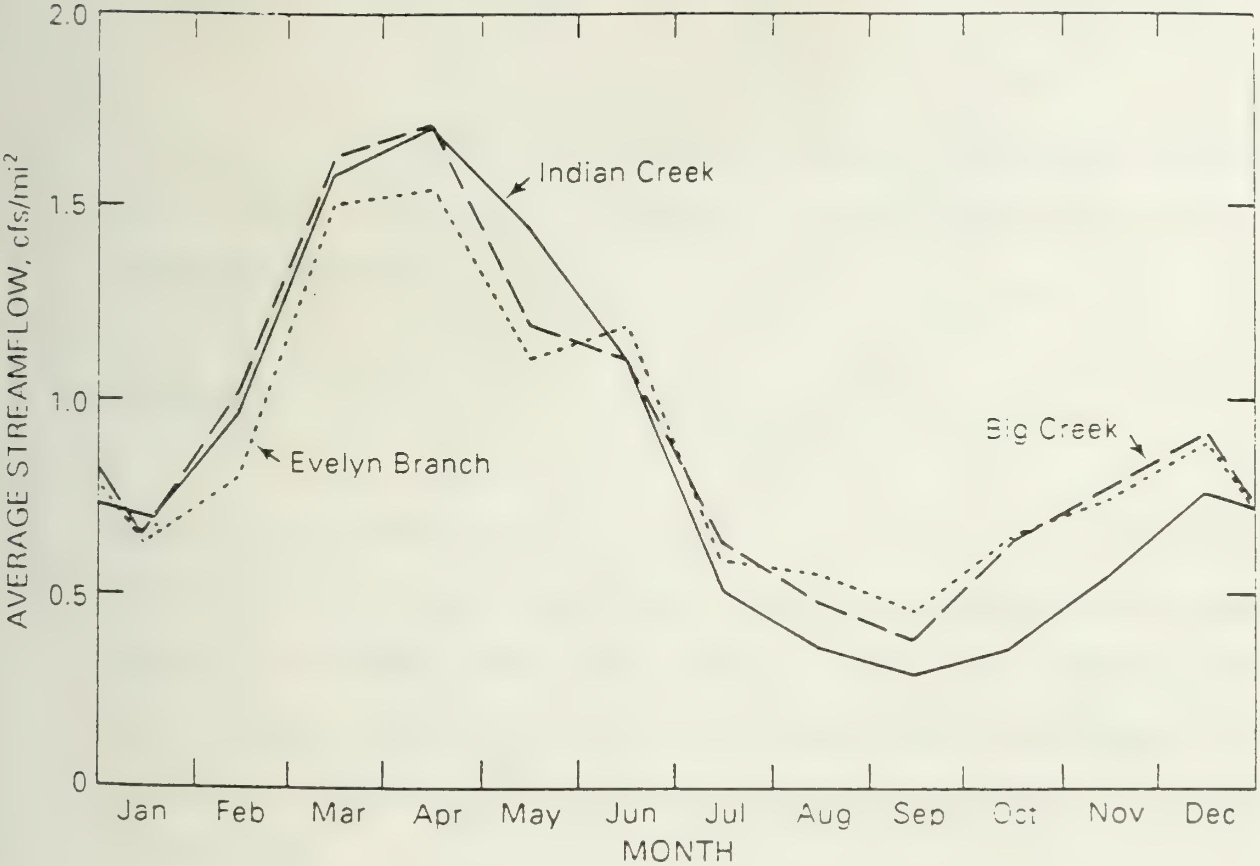


FIGURE V-2

SEASONAL DISTRIBUTION OF STREAMFLOW FOR SELECTED GAGES

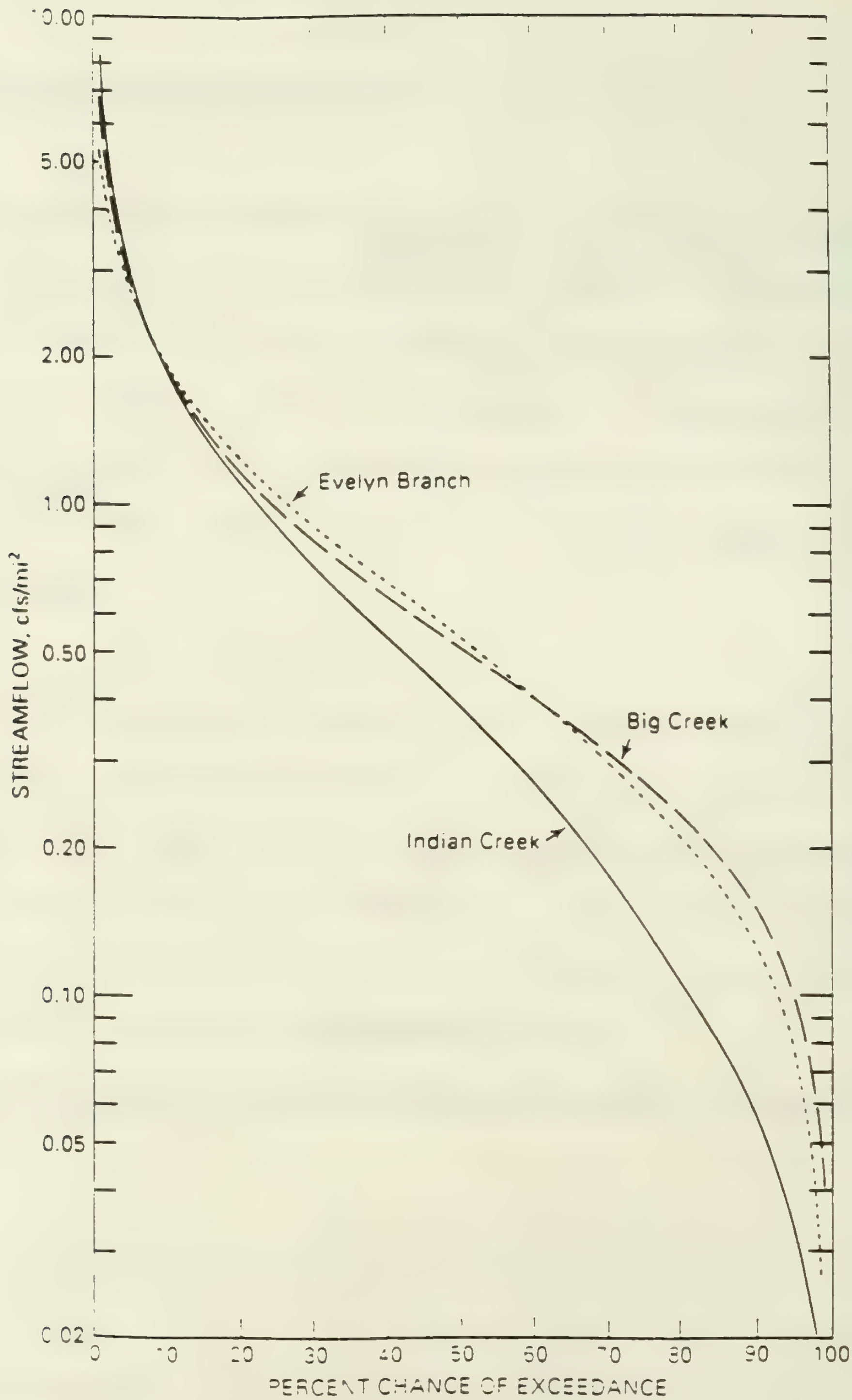


FIGURE V-3
FLOW DURATION RELATIONSHIP FOR SELECTED GAGES

baseflow, which is the portion of the flow originating from lakes and shallow groundwater.

Low Flows

The lowest flows given in the flow-duration relationships in Figure V-3 are almost equal to zero. Zero flow may be expected in smaller watersheds during the dryer seasons in most years.

High Flows

High flows for small streams such as those in the petition area can display great variability. The magnitude of high flows depends on many factors in the watershed, including stream slope, channel length, land cover, and lakes that provide detention storage during flood events. For many surface-mined regions, high flows may be reduced from natural conditions because the resulting lakes provide considerable flood storage.

Flood Boundaries

Boundaries of the 100-year flood (the flood with a one percent probability of occurring during any given year) are provided in the Flood Insurance Rate Map [FIRM] for the Unincorporated Areas of Knox County (Federal Emergency Management Agency, 1984). Panel number 170914-0200B of this study shows designated flood hazard areas. Flood boundaries for nearby locations in Peoria and Fulton counties are provided by panel numbers 170533-0100B and 170241-0050C, respectively (Federal Emergency Management Agency 1983, 1986). The boundaries

of the 100-year flood given in these studies were slightly modified to match improved topographic information for the petition area. The modified boundaries of the 100-year flood are presented in Map 30 for the petition area and Map 82 for the three county area.

Flood Elevations

The elevation of the 100-year flood has not been defined for any portion of the petition area.

<u>Reservoirs and Lakes</u>

Within the petition area, there is a series of small final-cut lakes. Most of these lakes are small in surface area, and no well-defined hydraulic connection exists among them. Map 31 shows the distribution of the lakes greater than ten acres in the petition area.

In the three-county region, most of the lake surface area consists of the backwater lakes along the Illinois River. According to the National Wetland inventory (NWI), the total surface area of the lakes amounts to 18,042 acres. Most of the lakes have very small surface areas, but 805 lakes have surface areas greater than five acres. The surface areas of the largest 20 lakes cover 7,442 acres, or 41 percent of the total lake surface areas. The distribution of shallow and deep water lakes greater than five acres in the three-county area are shown in Map 32.

The existing lakes and reservoirs in the three-county area, as reported by Dawes and Terstriep (1966), are summarized in Table V-3.

TABLE V-3

EXISTING LAKES AND RESERVOIRS IN THE THREE-COUNTY AREA*

Reservoir name	Owner	Watershed area (sq mi)	Height of dam (ft)	Depth of water at dam (ft)	Pool area (acres)	Storage capacity (ac-ft)
North Res.	Astoria	0.46	28	12	10 .6	55
South Res.	Church of Bethren Camp of Emanual	0.70	35	30	46 .0	675
Anderson Lake	State of Illinois		6	2-5	1,396	
Avon Country Club Res.	CB & Q R.R.	2.76	20	12	21.0	21
Van Winkle Lake	D.C. Pickett	4.97			14 .7	48
Canton Lake	Canton	15.2		30	230	3,541
Rice Lake	State of Ill.				1,206.3	
Miserable Lake					145	
Slim Lake						
Pond Lily Lake					65	
Big Lake					1,147.5	
Goose Lake					630	
Lost Lake					46.8	
Route 136 Borrow Pit					49.0	
Keystone Anglers Cb.	Peabody Coal Co.				8.0	
Hiram Walker Rod & Gun Club	Peabody Coal Co.				30.0	
Tipple Lake	Sentry Royalty Co.	0.44	30	20	16.0	
Lets Kech U Wan Lake Club	Oscar Linn				22.7	
Kwee-Ma-Tuk Hills	Kwee-Ma-Tuk C. Club			27	587.9	
National Lake	Peabody Coal Co.				30.0	
Tipple Lake	Ayshire Colliery	1.25	30	25	20	
Sweeney's Pond	D.K. Sweeney	0.34	29	20	7.5	
Boy Scout Lake	Creve Coeur Co (BSA)	1.14	33	24	16	
CB&Q Res.	CB&Q R.R.	0.15			7.7	
Lake Storey	Santa Fe R.R.	7.9			162.5	
Rice Lake	CB&Q R.R.	3			70.3	
Highland Lake	CB&Q R.R.	0.2			25	
Lake Bracken	CB&Q R.R.	8.9	49	32	181	2,452
Calhoun Lake	Galva C. Cb.	13.1	28		50.2	112
Purington Lake No. 1	East Galesburg	0.7			5.8	

TABLE V-3 (Concluded)

EXISTING LAKES AND RESERVOIRS IN THE THREE-COUNTY AREA*

Reservoir name	Owner	Watershed area (sq mi)	Height of dam (ft)	Depth of water at dam (ft)	Pool area (acres)	Storage capacity (ac-ft)
Purington Lake No. 2	East Galesburg	1			12.5	
Horseshoe Lake						
Knox Co. Cons. Cb.	Knox Co. Cons. Cb.	0.4	32	23.2	6.3	55
Elmwood Res.						
Peoria Water Works Res.						
Keystone Steel Res.	Stanolind Pipe Co.					
Meadow Lake						
Bemis Bag Res.	Timber Lake C. Cb.	0.37			7.9	
	Arrowhead C. Db.	0.53			5.0	
Pond Lily Lake		0.31			69	
LaMar Quarry					6.6	
McGrath Gravel Pit						50.0
Orange Prairie Lake		0.18			5.0	
Radnor Lake	Lakewood C. Cb.	0.08			5.0	
	Vincent Turner	0.12			8.0	
	Comm. Nat'l Bk & Trust	0.15			5.0	

*From Dawes and Terstriep (1966)

According to Dawes and Terstriep (1966), there are 22 potential reservoir sites in Fulton County, 13 in Knox County, and 15 in Peoria County. These sites were selected according to the following criteria: (1) the surface area should be larger than 50 acres, (2) the maximum depth at the dam should not be less than 20 feet, (3) average mean water depth should not be less than 7 feet, (4) time to fill should meet specified criteria related to the capacity/watershed relationship, (5) the capacity loss should be less than 2 percent per year, (6) maximum dam length should be 0.5 mile, and (7) maximum dam height should be 90 feet. The sites are tabulated in Table V-4 and their locations are displayed in Map 33.

The potential site closest to the petition area is Littlers Creek, which is about four miles southeast of Maquon. Its watershed contains the city of Farmington and a few active surface mines. This site has the potential to be developed as a 768-acre reservoir with a 13,563-acre-foot capacity. The site has been rated as geologically feasible. Additional boring would be required to determine the nature and depth of bedrock.

TABLE V-4

POTENTIAL RESERVOIRS IN THE THREE-COUNTY AREA

	Waterway location	Spillway elevation (ft)	Pool area (acres)	Storage (ac-ft)	Watershed (sq mi)	Depth at dam (ft)	Length of dam (ft)	Mean annual runoff (mgd)	Net Yield* (mgd) 5 yr	10 yr	25 yr	40 yr
Peoria Co.	Trib. Spoon River	660	262	4,365	4.6	50	1,050	1.76	1.5	1.5	1.5	1.5
	Henry Creek	640	128	2,388	4.2	56	800	1.99	1.9	1.6	1.3	1.2
	Senachwine Creek	600	1,062	27,612	42.7	78	1,700	20.25	19.9	17.6	15.0	14.3
	Jubilee Creek	680	281	6,556	7.2	70	850	2.84	2.5	2.5	2.5	2.5
	Hickory Run	700	64	1,237	3.0	58	400	1.18	1.1	0.9	0.8	0.8
	Jubilee Creek	600	1,312	27,985	34.4	64	1,150	13.56	12.8	12.6	12.6	12.2
	Trib. Kickapoo Cr	580	90	1,500	2.5	50	650	0.99	0.9	0.9	0.8	0.7
	Johnson Run	540	211	2,954	11.5	42	800	4.53	4.2	2.9	2.2	1.9
	Nixon Run	600	243	3,482	8.9	43	700	3.51	3.4	2.7	2.3	2.1
	Trib.W.Fk. Kickapoo	620	115	1,495	3.2	39	700	1.26	1.2	1.0	0.9	0.8
	Trib.W.Fk. Kickapoo	700	230	3,680	5.0	48	500	1.97	1.8	1.8	1.7	1.6
	E. Br. Copperas Cr	620	416	8,457	12.2	61	800	4.67	4.5	4.4	4.2	4.0
	W. Br. LaMarsh Cr	560	448	4,776	15.5	32	1,000	5.93	5.7	4.2	3.9	3.3
	Little LaMarsh Cr	580	198	3,960	3.9	60	550	1.49	1.3	1.3	1.3	1.3
Knox Co.	E. Br. Copperas Cr	580	3,155	90,422	61.3	86	1,700	23.47	20.1	20.1	20.1	20.1
	Trib. Henderson Cr	740	154	2104	3.4	41	600	1.26	1.2	1.1	1.0	0.9
	Trib. Walnut Creek	750	192	1664	6.1	26	850	2.34	2.2	1.5	1.3	1.1
	Trib. Walnut Creek	750	294	3,330	5.7	34	900	2.18	2.0	1.9	1.8	1.6
	Foreman Creek	730	742	7,420	26.5	30	850	10.14	9.8	6.9	5.6	5.2
	Trib. Walnut Creek	720	583	7,760	10.9	40	800	4.17	3.8	3.7	3.6	3.5
	Snakeden Hollow	660	326	6,510	10.4	60	900	3.98	3.8	3.7	3.6	3.3
	Middle Creek	780	102	1,360	3.7	40	550	1.42	1.4	1.1	1.0	0.9
	Trib. Court Cr	700	166	2,320	3.8	42	700	1.45	1.4	1.3	1.2	1.1

*Not yield for given recurrence interval in years

TABLE V-4

	Haw Creek	690	627	10,030	18.5	48	500	7.08	6.8	6.4	5.8	5.6
	French Creek	680	154	2,412	3.8	47	800	1.45	1.4	1.3	1.2	1.1
	Trib. Brush Creek	680	205	2,595	4.5	38	650	1.72	1.6	1.5	1.4	1.3
	Indian Creek	640	435	6,380	14.0	44	500	5.36	5.2	4.5	4.1	3.8
Fulton Co.	Littlers Creek	620	768	13,563	22.4	53	1,400	8.58	8.2	8.0	7.4	6.9
	Swegle Creek	560	280	2,800	15.5	30	700	5.93	4.5	3.3	2.5	2.3
	Trib. Littlers Cr	720	75	600	2.9	25	650	1.11	0.9	0.6	0.5	0.4
	Coal Creek	600	1,100	29,300	32.1	80	1,100	12.29	11.1	11.1	11.1	11.1
	Aylesworth Branch	600	130	1,600	3.9	38	700	1.52	1.5	1.2	1.1	1.0
	Trib. Shaw Creek	610	406	5,400	7.4	40	600	2.88	2.4	2.4	2.4	2.4
	Big Creek	680	115	1,200	3.0	32	650	1.15	1.1	0.9	0.8	0.7
	Middle Branch	560	704	14,080	27.4	60	900	10.49	2.8	2.6	1.7	1.7
	Trib. Big Creek	640	190	1,900	4.6	30	700	1.76	1.6	1.4	1.2	1.1
	Put Creek	540	2,110	35,200	91.2	50	1,850	35.44	34.6	28.3	25.2	23.8
	Shaw Creek	540	755	9,600	37.5	38	800	14.57	13.5	9.7	8.0	7.5
	Trib. S.Fk. Shaw Cr.	580	74	1,000	1.5	40	400	0.58	0.5	0.5	0.5	0.4
	Barker Creek	600	415	10,100	16.0	73	800	6.22	6.0	5.9	5.5	5.3
	Muddy Creek	560	175	4,000	3.7	68	800	1.44	1.3	1.3	1.3	1.3
	Slug Run	560	230	3,500	7.9	45	750	3.07	2.9	2.5	2.2	2.1
	Duck Creek	520	621	14,500	17.9	70	1,150	6.95	6.3	6.3	6.3	6.3
	Rattlesnake Branch	560	144	2,400	3.1	50	450	1.20	1.1	1.1	1.1	1.1
	Francis Creek	540	395	8,200	11.0	62	1,100	4.27	4.1	4.0	3.9	3.9
	Sugar Creek	640	465	7,100	11.4	46	850	4.43	4.2	4.1	3.8	3.6
	Otter Creek	620	422	6,000	7.2	43	1,000	2.8	2.3	2.3	2.3	2.3
	Jake Creek	580	150	2,400	4.3	48	650	1.67	1.6	1.5	1.3	1.3
	East Creek	520	285	3,800	7.3	40	650	2.84	2.7	2.5	2.2	2.0
	Wilson Creek	520	285	5,300	11.7	56	800	4.55	4.4	3.9	3.5	3.3

Wetlands

Wetlands are lands transitional between terrestrial and aquatic systems which are at least periodically saturated with or covered by water at some time during the growing season. Saturation with water is the dominant factor determining the nature of the soil development and the plant and animal communities associated with these areas (Cowardin et al. 1979).

Wetlands data used in the analysis of the petition area were obtained from the Illinois Wetlands Inventory, a computerized database based on the National Wetlands Inventory (NWI) created by the U.S. Fish and Wildlife Service (USFWS). Maps delineating shallow water wetlands and deepwater habitat (2 meters or more in depth) were created by USFWS through photointerpretation of high altitude, infrared photographs. The maps were then converted to digital form at a scale of 1:24000. Wetlands as small as a fraction of an acre are captured in the Inventory. Photographs for the petition area were taken in April 1983 and April 1984.

In addition to its geographic location and configuration, each wetland and deepwater habitat is described by a set of attributes including perimeter (for polygon features), length (for line features), area, NWI code, and Illinois code. Two hierarchical coding systems were developed to group ecologically similar wetland habitats. The NWI coding system divides wetlands and deepwater habitat into major groups called systems. In Illinois there are three systems: palustrine (e.g., marshes, bottomland forests, swamps, wet meadows); lacustrine (e.g., lakes, impounded river channels); and riverine (e.g., rivers, streams). Systems are further subdivided according to factors such as soil or substrate type, plant community, water regime (e.g.,

temporarily flooded, permanently flooded), and human modifications (e.g., impoundment, farming, excavation). The Illinois coding system was developed by the Illinois Department of Conservation on the basis of logical groupings of the NWI codes. Several hundred possible NWI codes are reduced to fewer than sixty Illinois codes, as listed in Table V-5.

Wetlands for the petition area and the surrounding area are depicted in Maps 34-38 and summarized in Table V-5. In the petition area, 4.8 percent of the total acreage are classified as shallow water wetland or deepwater habitat, with shallow water wetlands composing 3.9 percent (252 acres) and deepwater habitat composing 0.9 percent (56 acres) of the total petition area. Nearly 80 percent are palustrine, 17 percent are lacustrine, and 3 percent are riverine. The Inventory recognizes 334 separate wetland and deepwater entities in the petition area, with a maximum size of 24.61 acres, a minimum of .001 acres, and a mean of 0.92 acres. It should be noted that individual entities may be adjacent, sharing a common boundary and forming larger wetland complexes.

TABLE V-5

WETLANDS SUMMARY DATA FOR PETITION AREA

Habitat Type	Total Habitat Acres	% of Total Land	% Art*	% Nat*
Shallow Water Wetland Habitat				
Palustrine Wetlands				
Shrub-scrub Wetlands	0.64	0.0	34.4	65.6
Forested Wetlands				
Swamp	0.00	0.0	0.0	0.0
Bottomland Forest	14.60	0.2	0.0	100.0
Emergent Wetlands				
Wet Meadow	2.98	0.0	69.5	30.5
Marsh	15.46	0.2	100.0	0.0
Open Water Wetlands	212.25	3.3	100.0	0.0
Subtotal Palustrine Wetlands	245.93	3.8	93.5	6.5
Lacustrine Wetlands				
Littoral Lake	0.00	0.0	0.0	0.0
Littoral Shore	0.00	0.0	0.0	0.0
Littoral Emergent	0.00	0.0	0.0	0.0
Subtotal Lacustrine Wetlands	0.00	0.0	0.0	0.0
Riverine Wetlands				
Lower Perennial	0.00	0.0	0.0	0.0
Upper Perennial	0.00	0.0	0.0	0.0
Intermittent	6.00	0.1	0.0	100.0
Unknown Perennial	0.00	0.0	0.0	0.0
Subtotal Riverine Wetlands	6.00	0.1	0.0	100.0
TOTAL SHALLOW WATER WETLANDS	251.93	3.9	91.3	8.7
Deepwater Habitat				
Lacustrine Habitat				
Limnetic Lake	53.14	0.8	100.0	0.0
Subtotal Lacustrine	53.14	0.8	100.0	0.0

Table V-5 (Concluded)

Habitat Type	Total Habitat Acres	% of Total Land	% Art*	% Nat*
Riverine Habitat				
Lower Perennial	2.81	0.0	0.0	100.0
Upper Perennial	0.00	0.0	0.0	0.0
Intermittent	0.00	0.0	0.0	0.0
Unknown Perennial	0.00	0.0	0.0	0.0
Subtotal Riverine Habitat	2.81	0.0	0.0	100.0
TOTAL DEEPWATER HABITAT	55.95	0.9	95.0	5.0
TOTAL ALL HABITAT	307.88	4.8	92.0	8.0

* Art = "Artificial" means the area has been diked, impounded, or excavated.
Nat = "Natural" means the area has not been diked, impounded, or excavated.

The dominant shallow water wetland type is open water (86%), with the remainder made up of small acreages of marsh, bottomland forest, wet meadow, and shrub-scrub wetlands (Table V-5). Among shallow water wetlands, 91 percent are classified as "artificial" or managed, i.e., wetlands which have been created by excavation, dikes, or impoundments. Wetlands which have not been excavated, diked, or impounded are limited to a total of approximately 24 acres and consist of a small palustrine forested, area and a tributary of French Creek in the northwest corner, and portions of the West Fork of Kickapoo Creek which are classified as palustrine forest in the northeast corner of the petition area (Map 34). Field observation of the latter area by Natural History Survey biologists indicates that the

area has been heavily grazed. Deepwater habitat is 95 percent limnetic lake type, with the remainder composed of lower perennial riverine habitat.

Field observations by wetlands biologists at the Natural History Survey confirmed the characterization of the wetland resource listed in the Inventory. The biologists reported finding nearly all the wetlands to be man-made open water areas (ponds) usually with steeply sloping sides with heavily grazed margins. The wetlands vegetation analysis is given in Chapter VIIA. The wetland resource of the petition area has been heavily influenced by previous mining activities.

In the three county area, wetlands are abundant because portions of the area are located in the Illinois River bottomland. According to the National Wetlands Inventory (NWI), the total acreage of the classified wetland is 48,708 acres as shown in Table V-6. Lake-related wetland covers 25,544 acres (Map 39), river-related wetlands 2,539 acres (Map 40), and other wetlands 20,625 acres (Map 41). The distribution of the wetlands is shown in Maps 39-41.

TABLE V-6

SUMMARY OF THE WETLANDS IN THE THREE-COUNTY AREA

	Number of tracts	Acres
Lake-related	8,798	25,544
River-related	443	2,539
Other wetlands	5,853	20,625
Total	15,094	48,708

Sediment Load

Ten sediment monitoring stations in the region (U.S.G.S. 1972 through 1989) are identified in Table V-7. The locations of these stations are shown in Map 43. Instream suspended sediment data are compiled by various agencies and sources, and are published by the USGS. The Illinois State Water Survey has one station at the Spoon River at London Mills, (Map 42) as part of the Illinois Benchmark Network (IBN) program (Davie, 1988; ENR, 1983). The Illinois Environmental Protection Agency also conducts statewide sediment-related water quality monitoring. As shown in Table V-7, most of the stations have relatively short records. The sediment loads given in the table were computed on the basis of streamflow and sediment concentration. Because streamflows and sediment concentrations vary rapidly, the maximum and minimum loads in tons per day show a wide range of variation.

TABLE V-7

SUSPENDED SEDIMENT MONITORING STATIONS IN THE REGION

Map ID	Station Name	Drainage Area (sq mi)	Monitoring agencies	Period of record	Max. load (tons / day)	Min. load
13	Ill.R. at Water Co. at Peoria	13,900	IEPA	1978-89	11,310	14.0
19	Kickapoo Cr. at Bartonville	304	IEPA	1979-89	8,990	2.0
*	Spoon R. at Wyoming	197	IEPA	1979-81	3,530	4.0
*	Indiana R. at Wyoming	63	IEPA	1978-81	1,360	.03
14	Spoon R. at London Mills	1,062	IEPA	1978-89	17,310	1.0
30	Spoon R. at Seville	1,636	IEPA	1978-81	24,960	1.6
22	W. Branch of Big Cr near Canton	4.2	USGS	1978-81	20	.01
29	Big Cr at St. Davis	26.7	USGS	1972-80	6,660	.03
29	Big Cr near Bryant	40.3	USGS	1972-81	12,500	.05
32	Slug Run near Bryant	7.1	USGS	1976-80	181	.02

*Stark County

Water Quality

Long-term water quality effects of surface-mine operations on Littlers Creek and Kickapoo Creek may be estimated by information generated from nearby watersheds. An ENR report (Roseboom et al. 1986) which present the results of a study of the Court Creek watershed (near Galesburg) by the Illinois State Water Survey, compared the water quality effects of pre-law surface-mined land with those

resulting from other land uses in the watershed (Map 44). The S5 stream station represented surface-mined lands.

The effects on the water quality of the three major land uses (surface mining, residential housing, and agriculture) in the upland prairie subwatersheds at station S5, C12, and M3 (Map 44) are shown in Table V-8. Of these three land uses, agriculture -- principally row crops -- causes the greatest increase in the concentration of suspended sediment and particulate nutrients. Nitrate concentrations in the runoff from the M3 subwatershed are the highest of those at any station. Surface mining and residential land uses increase the sulfate and chloride levels at S5 and C12, respectively, but these are well below regulated levels.

TABLE V-8

A COMPARISON OF LAND USE EFFECTS ON STREAM QUALITY DURING RAINFALL EVENTS

(Court Creek Watershed Study)

Landform:	Prairie	Prairie	Prairie
Land use:	surface mine	residential	agriculture
Stream station:	S5	C12	M3
Flow (cfs)	50	25	32
Sediment (mg/l)	244	107	904
Total ammonia-N (mg/l)	0.23	0.22	0.52
Diss. ammonia-N (mg/l)	0.14	0.12	0.16
Kjeldahl-nitrogen (mg/l)	1.40	1.00	4.80
Nitrate (mg/l)	1.47	2.70	3.12
Total phosphate-P (mg/l)	0.33	0.34	2.72
Diss. phosphate-P (mg/l)	0.04	0.07	0.21
Alkalinity (mg/l)	139	146	82
Sulfate (mg/l)	179	55	19
Chlorides (mg/l)	7	25	3
TDS (mg/l)	469	308	160

The relative effects of land use on stream yields are shown in Table V-9 for the prairie subwatersheds of S5, C12, and M3. Of the three upland prairie subwatersheds, the agricultural rowcrop M3 subwatershed had the greatest sediment yield. Brabets (1984) also found that agricultural watersheds transport more sediment than surface-mined watersheds. The surface-mined subwatershed S5 had higher sediment stream yields than the residential C12 subwatershed. The residential C12 subwatershed, however, had higher nutrient stream yields than the surface-mined watershed in every parameter except Kjeldahl-nitrogen.

TABLE V-9

A COMPARISON OF LAND USE EFFECTS ON THE ESTIMATED ANNUAL STREAM YIELDS*

(Court Creek Watershed Study)

Landform:	Prairie	Prairie	Prairie
Land use:	surface mine	residential	agriculture
Stream station:	S5	C12	M3
Sediment (tons)	1.0	0.7	1.7
Total ammonia-N (lbs)	1.4	1.8	2.5
Diss. ammonia-N (lbs)	0.9	1.0	1.0
Kjeldahl-nitrogen (lbs)	8.2	8.0	18.7
Nitrate-N (lbs)	8.0	15.6	14.5
Total phosphate-P (lbs)	2.0	2.9	7.4
Diss. phosphate-P (lbs)	0.2	0.5	1.5
Alkalinity (tons)	0.4	0.4	0.3
Sulfate (tons)	0.5	0.1	0.0
Chlorides (tons)	0.0	0.1	0.0
TDS (tons)	1.4	0.9	0.6

* Calculated on a per-acre basis

Of the three major land uses in the three upland prairie subwatersheds, the row crop and feedlot operations in the M3 subwatershed had by far the greatest water quality impacts on the receiving stream. The M3 stream yields of sediment and total ammonia were at least 70 percent greater than those at either C12 or S5. Stream yields of Kjeldahl-nitrogen at M3 were more than double the annual stream yields at C12 and S5. Nitrate yields at M3 and C12 were similar but were almost 100 percent higher than at S5. The stream yields of dissolved ammonia had very little variation between any of the subwatersheds, but the yield of dissolved phosphate from the M3 subwatershed was at least three times greater than that from C12 or S5. None of the yields of dissolved minerals, including sulfate, chloride, and total dissolved solids (TDS), present water quality problems. This is also true in the subwatersheds with the greatest stream yields.

Land use maps (Maps 45 and 46) indicate similar land use patterns and topography to those in the projected work site (Map 47).

Chemical analyses of stream waters from Knox and nearby counties (Map 43) by the U.S. Geological Survey have shown a similar increase in total dissolved solids and sulfates where drainage results from surface mine runoff. If tipple and other coal processing areas have been reclaimed, however, the buffering capacity of the limestone overburden keeps alkalinity values above 100 mg/l in the stream waters. The higher alkalinity of these waters will cause precipitation of iron and other heavy metals out of the water. This precipitation process causes stream sediments in mining areas to be high in iron. Precipitation decreases the amounts of iron and other dissolved minerals in water flowing from the mined areas. Since total dissolved solids is the sum of all minerals dissolved in the water column, total dissolved solids in the water are reduced by such precipitation.

Within similar geologic regions, iron levels in stream waters from mined areas are similar to iron levels in stream waters from watersheds without mining activities. The geology of western Illinois results in iron levels in streams exceeding Illinois state standards regardless of watershed land use (Flemal 1980). With the exception of total dissolved solids, Terstriep and Lee (1979) found the water quality of streams in the Spoon River basin to be similar regardless of watershed land use. As in the S3 subwatershed of Court Creek, total dissolved solids in stream waters from mined areas did not exceed state standards.

CHAPTER VI

SOIL RESOURCES

A. INTRODUCTION

The soil resources are of critical interest and importance in the petition process, for they, more than any other characteristic, control the productivity and end uses of the area (whether or not the area is mined). In general, the soils of the petition area are of very high capability and productivity. The Ipava, Tama and Sable soils, for example, are some of the most productive agriculture soils in the world. Twenty-eight soil series types are represented in the petition area, comprised of 41 different mapping units (Table 1 Appendix E). However, just three major soil types account for 76.1 percent of the land area within the petition site. The Tama soil series dominate, making up 41.7 percent of the land area, the Lenzburg soils 22.0 percent, and the Ipava soils 12.4 percent. Soils in previously mined areas, including the Lenzburg and Rapatee series, make up 22.1 percent of the petition area. Ten of the soil series have an area of less than 3 hectares, and combined, account for only 0.6 percent of the total petition area. Water covers 1.9 percent of the petition site.

To examine whether soils in the petition area are representative of the region where the petition area is located, soils data were also evaluated for a 36-section area that included the petition site and a 1-section wide buffer surrounding the petition area (hereafter referred to as the buffer). The buffer includes six sections in Peoria County and five in Fulton County. No modern (post 1950) soil survey data were available for Fulton County, so no soils data are presented for those five sections. In the buffer, 56 soil mapping units were found, or 15 additional from the petition area (Table 1 Appendix E). Of these 15 mapping units, three were of soil series that did not occur in the petition area, two were nonsoil map designations (mine dumps and gravel pits), and ten were of soil series that did occur in the petition area but as different mapping units (different slope and/or erosion classes). Only one soil series,

Dorchester silt loam, occurred in the Knox County portion of the buffer but not in the petition area. Jules silt loam and Paxico silt loam occur in Peoria County but not Knox County and therefore were not represented in the petition area. The same three soil series which dominated the petition area, Tama, Lenzburg, and Ipava, also dominated the buffer area, accounting for 65.8 percent of the area (compared to 76.1 percent of the petition area). Tama occurred over 27.0, Lenzburg over 26.6, and Ipava over 12.2 percent of the buffer area. Previously mined soils represented 30.8 percent of the buffer (Map 48). The highly productive Tama, Ipava and Sable soils, at issue in the petition, overwhelmingly dominate the petition area (56.3%), while they are only 40.7 percent of the buffer area and 45.1 percent of Knox County. Therefore, the petition area does represent higher than average soil productivity for the region (see later discussion of soil productivity in this chapter).

B. SOIL DESCRIPTIONS

Soil Associations

Tama-Ipava-Sable Association

This association is the most common association in Illinois, making up 8.5 percent of the state's total land area. It occurs in central and west central Illinois. Its highly productive, dark-colored soils formed in loess under native prairie. Moderately developed, these soils are well structured and permeable, making them well suited to intensive corn and soybean production. Tama soils are subject to erosion, and Ipava and Sable soils usually require draining (Fehrenbacher et al. 1984). The Knox County Soil Survey further divides the Tama-Ipava-Sable Association into the two following associations.

Ipava-Sable Association -- This association makes up 9 percent of Knox County and is about 50 percent Ipava soils, 30 percent Sable soils and 20 percent minor soils. It is used mainly for cultivated crops or pasture. These soils are well suited to cultivated crops provided the poorly drained soils (Sable) are drained to lower the seasonal high water table.

Tama-Ipava Association -- The soils in this association are nearly level to strongly sloping and formed in loess on uplands. However, these slopes are generally long and smooth and range from 0 to 15 percent. This association makes up 15 percent of the county and is 55 percent Tama soils, 25 percent Ipava soils and 20 percent minor soils. The nearly level or gently sloping soils in this association are used for crops, pasture and hay, and are generally well suited to these uses. Erosion is a major hazard in these soils due to high slope angles. The seasonal high water table, the moderately slow permeability, and shrink-swell potential are the major engineering limitations of this soil association. This association is the predominate one found in the petition area.

Rozetta-Clarksdale-Elco Association

This association is characterized by nearly level to steep, moderately well drained to somewhat poorly drained soils formed in loess or a mixture of loess and glacial till on uplands. It makes up 24 percent of Knox County, and is 55 percent Rozetta, 15 percent Clarksdale, 10 percent Elco soils, and 20 percent minor soils. Erosion is a major hazard, but these soils are generally well suited to cultivation. Again, the seasonal high water table and the moderate permeability are the major engineering limitations of these soils.

Lawson-Sawmill-Huntsville Association

This association is one of the most widespread in the state. It makes up about 6.5 percent of the state's total land area, and 7 percent of Knox County's. It is about 45 percent Lawson soils, 20 percent Sawmill soils, 15 percent Huntsville soils, and 20 percent minor soils. All of these soils formed in silty alluvium on bottomlands. These soils respond well to good management and corn and soybeans may be grown on them. However, flooding may delay harvesting and wetness is a problem for cultivation and engineering on the poorly drained soils of this association.

Lenzburg-Rapatee Association

These soils range from gently sloping to very steep and they formed in loamy mine spoil. Numerous water areas 8 to 32 hectares in size are scattered throughout this association. The association makes up about 5 percent of Knox County, and consists of 80 percent Lenzburg and 5 percent Rapatee. The steep-sloped soils (Lenzburg) are used mainly for pasture and some are left idle. The gently sloping areas have sometimes been reclaimed (Rapatee) and may be used for cultivation, but they are often restricted to hay and pasture. Erosion, low available water capacity, and short, irregular slopes are major limitations for agriculture, while shrink-swell potential and slow permeability are engineering limitations.

Soil Series

Information for the following soil series was taken from the Knox County Soil Survey (Windhorn 1986). The data selected for representation pertained primarily to

the capability for crop production since that is the main use (and proposed continued use) of the region. Soils for the petition and buffer area are shown on Map 48 and information on soil taxonomy can be seen in Table 1 Appendix E. Soil series discussed below are limited to those occurring within the petition area.

Alvin

This soil series is well drained and moderately rapidly permeable. Found on stream terraces and side slopes bordering major stream valleys, the slopes of this sandy loam or fine sandy loam range from 2 to 30 percent. Alvin tends to be strongly acid to medium acid in the control section (between depths of 10 to 40 inches). This soil also contains the most sand in the control section of all the soils in the petition area, and as such has a reduced productivity rating. It occupies only 1.57 hectares, accounting for 0.06 percent of the petition site. Alvin soils account for only 0.3 percent of Knox County soils and 0.02 percent of the buffer area.

Assumption

Moderately well drained, Assumption soils are located on shoulder slopes and side slopes in the uplands. Its slopes range from 5 to 15 percent. Air and water move through the upper part of the 51-inch thick subsoil at a moderate rate. The surface layer is generally neutral because of agricultural liming, and the subsoil is only slightly acid. Surface runoff is medium in cultivated areas and available water capacity high. The seasonal high water table is 3.0 to 4.5 feet below surface during the spring. Organic matter content is moderate in this silt loam. Assumption soils occupy 68.36 hectares or 2.6 percent of the petition site. County wide, they account for 1.6 percent of soils and are 1.5 percent of the buffer soils.

Atlas

This soil series is a somewhat poorly drained clayey soil found on upland side slopes and foot slopes. These soils formed in loess over a glacial till that has a well-developed paleosol, or buried soil. Air and water move through the Atlas soil at a very slow rate; thus the productivity ratings are quite low for this soil in the region. Surface runoff is rapid when this soil is cultivated. In addition, the perched seasonal high water table is within 2 feet of the surface, making the soil ill-suited for farming. At one time the surface layer of the series was 6 inches thick, with a subsoil 54 inches thick; however, the Atlas soils in the petition area have been severely eroded, leaving little of the original surface layer. The slopes of 10 to 18 percent, combined with the soil's propensity to erode, severely decreases this soil's farming potential. Atlas soils cover 4.85 hectares (0.15 percent) of the petition area, 0.3 percent of Knox County, and 0.10 percent of the buffer area.

Camden

This soil series is moderately permeable and moderately well drained, and found on stream terraces and side slopes bordering the major stream valleys. Formed in loess and in the underlying loamy sediments, Camden soils are similar to Fayette, Harvard, Rozetta, and Sylvan soils. Slopes range from 2 to 18 percent. The surface layer is a silt loam about 6 inches thick; the subsoil a firmer silty clay loam. The surface layer is slightly acid and the subsoil medium acid. Air and water move through at a moderate rate, and available water capacity is high. Surface runoff is rapid for the steep, cultivated areas, and most areas are used for row crops despite the Camden soil's relatively poor suitability for cultivation. The organic matter content is low, and the seasonal high water table is 4 to 6 feet below the surface. Camden soils occupy just 0.95 hectares or 0.04 percent of the petition site. County wide, they account for 0.3 percent of soils and 0.01 percent of the buffer area.

Clarksdale

This somewhat poorly drained soil is usually found on broad upland ridgetops but may sometimes be found on stream terraces near major drainageways. Nearly level, slopes range from 0 to 2 percent. These soils are similar to Keomah and Ipava soils. The surface layer is slightly acid and is composed of silt loam about 7 inches thick, and the firm silty clay loam subsoil is about 32 inches thick. The seasonal high water table is between 1 and 3 feet below the surface, and may delay planting in some years. Surface runoff is slow and air and water move through the Clarksdale soils at a moderately slow rate. Available water capacity is high and organic matter content is moderate. This series occupies 10.15 hectares or 0.39 percent of the petition area. They also represent 1.05 percent of the buffer soils and 2.7 percent of all soils in Knox County.

Coatsburg

This series consists of poorly drained, very slowly permeable soils on side slopes and foot slopes in the uplands. Slopes range from 5 to 12 percent. These soils formed in loess and in the underlying loamy glacial till. Similar to Atlas soils, the surface layer is a silty clay loam about 8 inches thick, and the subsoil is a firm, almost impenetrable, clay loam about 52 inches thick. Air, water, and consequently, roots move through the Coatsburg at a very slow rate and surface runoff is medium in cultivated areas. This series occupies 1.11 hectares or only 0.04 percent of the petition area. They account for 0.03 percent of the buffer soils and 0.1 percent in all of Knox County.

Denny

Denny is a nearly level poorly drained soil found in small areas of closed depressions on broad upland plains. This soil series occasionally ponds for brief periods in early spring. The surface layer is a silt loam about 9 inches thick. Below, the subsurface layer is also friable silt loam about 10 inches thick. The 33-inch thick subsoil is of firm gray silty clay, and the underlying material to 60 inches of light gray friable silt loam. Denny may be found in association with Keomah, Clarksdale, and Sable soils. Air and water move through Denny soil at a slow rate. Surface runoff tends to pond in cultivated areas, with a seasonal high water table from 0.5 to 2 feet below the surface in spring. Water capacity is high and organic matter content is moderate. Drainage is needed to make Denny soils suitable for cultivation. These soils occupy 2.87 hectares, or 0.11 percent, of the petition site. They also account for only 0.05 percent of the buffer and 0.2 percent of the county soils.

Downs

This series consists of gently sloping, moderately well drained soil found on ridgetops and upper side slopes, and sometimes stream terraces near major drainageways. Usually, the surface layer is a friable silt loam about 8 inches thick, with a subsoil of silty clay loam about 52 inches thick. The seasonal high water table ranges from 4 to 6 feet below surface. Air and water move through the Downs soil at a moderate rate. Surface runoff is medium under cultivation and subsoil is strongly acid, although the surface layer's pH is controlled by agricultural liming practices. Downs soils represent 1.91 percent of the petition area (4.98 ha). The series is also 1.91 percent of the buffer and 2.9 percent of Knox County.

Elco

Elco is a strongly sloping and moderately well drained soil found on shoulder slopes and side slopes in the upland. Slopes in the petition area range from 8 to 15 percent. The surface layer is a friable silt loam about 2 inches thick. The subsoil is a 53-inch thickness of friable silty clay loam and firm clay loam. Air and water move through the upper part of Elco soil at a moderate rate and through the lower part at a moderately slow rate. Surface runoff is rapid in cultivated areas. The seasonal high water table is 2.5 to 4.5 feet below the surface during the spring. Available water capacity is high and organic content moderately low. Elco soils occupy 74.8 hectares, or 2.87 percent of the petition area. County wide, they are 3.0 percent of the area and they cover 2.26 percent of the buffer.

Elkhart

This is a series of gently to steep sloping, well-drained soils found along upland drainageways and side slopes. They were formed in calcareous loess and are similar to Downs, Sylvan, and Tama soils. The surface layer is friable silty clay loam about 8 inches thick, with a 22-inch subsoil of firm silty clay loam. The underlying material is 60 inches thick, and of calcareous friable silt loam. Air and water move through the Elkhart soils at a moderate rate and surface runoff is medium in cultivated areas. Available water capacity is very high and organic matter content is moderate. The surface layer is slightly acid and the subsoil is medium acid. The Elkhart series cover 1.5 percent of Knox County, but 2.01 percent of the petition area (52.28 ha) and 2.14 percent of the buffer.

Fayette

This gently to strongly sloping, well drained soil is found predominantly on upland ridges and side slopes, although it may also occur on stream terraces near major

drainageways. The Fayette soil formed in loess and is similar to Downs, Hickory, Rozetta, and Sylvan soils. The surface layer is a friable silt loam about 7 inches thick with a subsoil 35 inches thick. The subsoil consists of an upper firm silty clay loam and a lower friable silt loam. The underlying material to a depth of 60 inches is friable silt loam. Air and water move through the Fayette soil at a moderate rate and surface runoff is medium. Available water capacity is very high and organic matter content low. The subsoil and surface layer are both medium acid. Fayette soils cover 2.57 hectares (0.10 percent) of the petition area. County wide, however, they comprise 3.1 percent of the soils; they occupy 0.51 percent of the buffer area.

Hickory

The Hickory series is a well-drained soil found on upland side slopes and foot slopes. Slopes in the petition area range from 10 to 30 percent. Related to Fayette, Atlas, and Marseilles soils, this series formed in 0-20 inches of loess over loamy glacial till. The surface layer is a friable silt loam that ranges from 4 to 7 inches in depth, and the subsoil is of both friable silty clay loam and firm clay loam about 45 inches thick. The underlying material is 60 inches of firm clay loam. Only moderately suited for farmland, this soil is subject to erosion and runoff is rapid in cultivated areas. Slopes in the petition area range from 10 to 30 percent. Hickory soils tend to be acidic, but this is controlled by local liming practices. This series occupies 63.67 hectares, or 2.44 percent, of the petition area. It covers 3.74 percent of the buffer area, but 7.8 percent of all soils in Knox County.

Huntsville

This is a nearly level, well drained soil found on flood plains near streams. It is occasionally flooded from brief periods from March through May. Formed in silty

alluvium, these soils are similar to Lawson and Sawmill soils, and are commonly found adjacent to them. Slopes in the petition area range from 0 to 2 percent. The surface layer is a friable silt loam about 10 inches thick. The subsurface layer is about 42 inches thick and is also a friable silt loam. The underlying material to 60 inches is again friable silt loam. Air and water move through this soil at a moderate rate. Surface runoff is slow in cultivated areas and available water capacity is high. Organic content is moderate, and reaction at the surface and subsurface layers is neutral. This soil is well-suited to cultivated crops, and dikes may be used to prevent flooding. Huntsville soils cover only 1.07 hectares (0.04 percent) of the petition site, 0.01 percent of the buffer area, and 1.1 percent of the entire county.

Ipava

A nearly level, somewhat poorly drained soil, Ipava is usually found on broad upland plains and ridgetops; however, it may sometimes be found on stream terraces near major drainageways. Ipava soils are similar to Clarksdale and Tama soils and are commonly adjacent to Sable and Tama soils. The 10-inch surface layer of friable silt loam overlays a subsurface layer of silty clay loam which is 8 inches thick. The subsoil is 32 inches thick, divided into two layers of silty clay loam. Air and water move through the Ipava soil at a moderately slow rate. Surface runoff is slow in cultivated areas and the seasonal high water table is 1 to 3 feet below the surface in spring. Available water capacity and organic matter content are both high. The surface layer is medium acid and the subsoil slightly acidic. This soil is well-suited to cultivation and has the highest corn productivity rating of all soils in the petition area. Ipava soils cover 323.4 hectares (12.39%) of the petition site. In the buffer, Ipava represents a similar fraction (12.23%), while county wide, it is even more common (16.9%).

Keomah

This poorly drained soil is found on level, broad ridgetops and upland drainage divides. The Keomah soils were formed in loess and are similar to Clarksdale, Ipava, and Rozetta soils. Both the surface and subsurface layers are of friable silt loam about 6 inches thick. The subsoil extends down 36 inches further and is composed of silty clay loam. The underlying material to a depth of 60 inches is of friable silt loam. Air and water move through the soil at a moderately slow rate, and organic matter content is moderately low. Surface runoff is slow in cultivated areas and the seasonal high water table is 2 to 4 feet below the surface during spring. Available water capacity is high, and the soil must be drained to be suitable for farming. Keomah soils cover 2.32 hectares, or 0.09 percent, of the petition site. They represent 0.36 percent of the buffer and 1.2 percent of Knox County soils.

Lawson

Lawson is a nearly level, somewhat poorly drained soil found on flood plains and the bottom of upland stream valleys. It may be occasionally flooded for brief periods from March through May. Formed in silty alluvium, Lawson soils are similar to Radford and Sawmill soils. Slopes in petition areas range from 0 to 2 percent. The 12-inch surface layer is of friable silt loam as is the 19-inch thick subsurface layer. The underlying material to a depth of 60 inches is again friable silt loam, but has iron concretions. Some Lawson soils overlay a buried claypan soil at a depth of about 40 inches. Air and water move through these soils at a moderate rate. Surface runoff is slow in cultivated areas and the seasonal high water table is 1 to 3 feet below the surface during spring. Available water capacity and organic matter content are high. The surface layer is mildly alkaline and the subsurface layer is neutral. This soil is well suited for cultivated crops although flooding and the seasonal high water tables are drawbacks. The Lawson series covers 21.96 hectares or 0.84 percent of the

petition site. It represents 2.85 percent of the buffer, and 3.4 percent of soils in Knox County.

Lenzburg

Lenzburg is a well-drained soil found on upland surface-mined areas. It is similar to Rapatee in that it is a product of surface mining activities and was formed in a regolith (mixture of fine earth material and fragments of bedrock) on uplands. Slopes in the petition area range from 0 to 70 percent, indicating that the previous mining operations did not include leveling of the post-mining landscape. The surface layer is of silty clay loam about 2 inches thick. The upper part of the underlying material is calcareous, friable silty clay loam about 15 inches thick. The lower part, to a depth of 60 inches, is calcareous, firm, channery loam. Air and water move through at a moderately slow rate. Surface runoff is rapid in pastured areas. Available water capacity is moderate and organic matter content is low. Reaction is neutral in the surface layer and mildly alkaline in the subsurface layer. The supply of phosphorous is low and rock fragments account for 10 to 30 percent of total volume. Crusting and sealing of the surface layer are common after hard rains. Some areas are prone to settling and slumping. The rock and density of the soils tend to restrict plant roots. Lenzburg soils presently occupy 573.9 hectares, or 22.0 percent, of the petition area. The buffer area also contains a high proportion of previously-mined Lenzburg soils (26.6%), whereas the county as a whole consists of only 4.1 percent Lenzburg.

Littleton

Found on stream terraces, this gently sloping, somewhat poorly drained soil has a surface layer of friable silt loam about 6 inches thick. Formed in silty alluvium,

Littleton soils have a subsurface layer of friable silt loam about 26 inches thick. The underlying material is also of friable silt loam that extends for 60 inches. Air and water move through this soil at a moderate rate and surface runoff is slow in cultivated areas. The seasonal high water table is 1 to 3 feet below the surface in spring, and available water capacity is high. Reaction is neutral in the surface layer. Littleton soils cover 5.41 hectares (0.21 percent) of the petition site. Only 0.07 percent of the buffer are Littleton soils, while they cover 0.3 percent of Knox County.

Marseilles

Slopes of Marseilles soils in the petition area range from 10 to 15 percent. A well-drained soil found on upland side slopes and foot slopes, Marseilles soils consist of moderately deep weathered shale and siltstone over bedrock. The surface layer is of friable silt loam only about 2 inches thick. The subsurface layer is also of friable silt loam, but is 3 inches thick. A 30-inch thick subsoil consists of firm silt loam. At a depth of 35 inches, there is an extremely firm shale and siltstone bedrock that crushes to silt loam. Air and water move through the upper part of Marseilles soil at a moderate rate and through the underlying shale and siltstone at a slow rate. Surface runoff is rapid in wooded areas and available water capacity is low. The soft shale and siltstone bedrock at a depth of 20 to 40 inches restricts root growth. The surface layer is slightly acid and subsoil medium acid. Only 0.74 hectares, or 0.03 percent, of the petition site, and 0.01 percent of the buffer are accounted for by this series, whereas 2.9 percent of Knox County contains Marseilles soils.

Orion

This nearly level, somewhat poorly drained soil is found on flood plains and the bottom of upland stream valleys. It is frequently flooded for brief periods from

March through May. These soils formed in silty alluvium overlying an older, buried soil and are similar to Lawson and Radford soils. Slopes range from 0 to 2 percent. The surface layer is a friable silt loam about 5 inches thick with 24 inches more of friable silt loam below. In the next 28 inches lies a friable and firm clay loam of buried soil. Finally, the underlying material to a depth of 60 inches is a firm silt loam. Air and water move through the Orion soil at a moderate rate and surface runoff is slow in cultivated areas. The seasonal high water table is 1 to 3 feet below the surface in spring, and available water capacity is very high. Organic matter content is moderately low. Orion soils occupy 3.03 hectares or 0.12 percent of the petition site, 0.07 percent of the buffer, but 0.5 percent of the Knox County area.

Orthents

These human-modified soils are somewhat poorly drained soils found mainly in cut and filled upland areas around highway cloverleaf interchanges. These soils are quite variable, but in this area, usually consist of silty clay loam and silt loam to a depth of 60 inches. In some areas they are covered with as much as 2 feet of coarser textured fill material, which includes gravel and stones. Air and water move through the Orthents at a moderate or moderately slow rate. Surface runoff is slow or medium. The seasonal high water table is 1 to 3 feet below the surface in the spring. Available water capacity is high. Orthents are the smallest soil unit in the petition area, covering only 0.69 hectares (0.03%). They only occupy 0.01 percent of the buffer and 0.2 percent of Knox County.

Radford

This is a nearly level, somewhat poorly drained soil found on floodplains and the bottom of upland drainageways. Formed in silty alluvium overlying a buried soil,

this soil is similar to Lawson, Sawmill, and Orion soils. It is occasionally flooded for brief periods from March through May. The surface layer is of friable silt loam about 9 inches thick. The subsurface layer and underlying material are also of friable silt loam and is about 11 inches thick. The underlying material is a thin strata of yellowish-brown material about 6 inches thick. The lower part of the soil (26-60 inches) is a buried soil of friable and firm silty clay loam. In some places, the underlying material is silt loam to a depth of more than 40 inches. Air and water move through the Radford soil at a moderate rate and surface runoff is slow in cultivated areas. The seasonal high water table is 1 to 3 feet below the surface during the spring. Available water capacity is very high and organic matter content is moderate. The soil is slightly acid in the upper part and mildly alkaline in the lower part. The Radford series covers 65.36 hectares (2.5%) of the petition area. They occupy 1.21 percent of the buffer area and 1.0 percent of the county.

Rapatee

This is a well-drained soil series with slopes ranging from 1 to 7 percent, and like Lenzburg, is a soil characterized by a history of mining activity. Found only in surface-mined areas that have been reclaimed (Lenzburg soils were not reclaimed), these soils formed in silty material over a regolith in surface-mined areas. The silty material was replaced after the areas were mined. Usually the surface layer is a friable silty clay loam about 3 inches thick. The upper part of the underlying material is a very firm silty clay loam about 15 inches thick. These upper sections represent the topsoil zone that was replaced last in the reclamation process (probably by earth moving equipment which compacts the soil). The next part is a very firm silty clay loam about 22 inches thick. [Note: Legally, Rapatee must be a total of 48 inches of A and B horizon materials; possibly 22 is a typographical error in the soil survey and should be 30 as is shown on a later page describing the typical pedon for

Rapatee.] Again, this was the replaced subsoil horizon, put back with earth moving (and compacting) equipment. The lowest part, to a depth of 60 inches, is mixed calcareous, very firm clay loam with a few coal and shale fragments. This zone represents the overburden material, leveled in the reclamation process prior to subsoil and topsoil replacement. In places, the mine spoil material is at the surface. Air and water move through this soil at a very slow rate. Surface runoff is medium in cultivated areas, and available water capacity is moderate. Organic matter content also is moderate. The surface layer is slightly acid. Underlying material is slightly acid in the upper part and mildly alkaline in the lower part. Dense underlying material tends to restrict roots, such that productivity is substantially lower than that of typical Ipava or Tama soils. Rapatee soils only cover 1.44 hectares, or 0.06 percent, of the petition area. However, they occupy a larger fraction of the buffer (4.14%) and county (0.3%) areas.

Rozetta

The slopes range from 1 to 10 percent for this series in the petition area and consist of moderately well drained soils on uplands and stream terraces. These soils formed in loess and are similar to Elco, Fayette, and Sylvan soils. Usually the surface layer is a friable silt loam about 9 inches thick. The subsoil is a silty clay loam about 44 inches thick. The upper part is friable and the lower part is firm. The underlying material to a depth of 60 inches is friable silt loam. Air and water move through these soils at a moderate rate. Surface runoff is medium in cultivated areas, and the seasonal high water table is 4 to 6 feet below the surface during the spring. Available water capacity is high and organic matter content is moderately low. Reaction in the surface layer is generally medium acid and the subsoil is strongly acid. About 2.54 percent of the petition area are Rozetta soils (66.4 ha). The buffer

is 5.39 percent Rozetta, while 11.1 percent of Knox County soils are comprised of this series.

Sable

This is a nearly level, poorly drained soil found on broad upland flats and in depressions and shallow upland drainageways. Formed in loess, these soils are similar to Edinburg soils and are commonly adjacent to Ipava and Tama soils. Typically, the surface layer is silty clay loam about 6 inches thick. The subsurface layer is about 15 inches thick of friable silty clay loam. The subsoil is of friable and firm silty clay loam about 23 inches thick. The underlying material to a depth of 60 inches is calcareous friable silt loam. Air and water move through this soil at a moderate rate. Surface runoff is slow in cultivated areas, and the seasonal high water table is 0.5 to 2 feet below the surface during spring. Available water capacity is very high and organic matter content is high. Reaction is neutral in both the surface and subsoil. Sable soils account for 56.96 hectares, or 2.18 percent, of the petition area. They occupy 1.5 percent of the buffer and 3.3 percent of the county.

Sawmill

The slopes of this poorly drained soil range from 0 to 2 percent. Found on floodplains and in small upland drainageways, this is a depositional soil formed in loess and is similar to Edinburg soils. It is frequently flooded for brief periods from March through May. The surface layers are of firm, silty clay loam about 38 inches thick. The subsoil is a firm and friable silty clay loam about 16 inches thick. The underlying material to a depth of 60 inches is of the same type. Air and water move through this soil at a moderate rate. Surface runoff is slow in cultivated areas, and the seasonal high water table is within a depth of 2 feet during spring. Available water capacity is very high and organic matter content is high. The surface layer is

mildly alkaline and the subsurface layer is neutral. The Sawmill series accounts for 0.32 percent or 8.45 hectares in the petition area. County wide, they occupy 1.3 percent, but only cover 0.54 percent of the buffer.

Sylvan

This well-drained soil is found on slopes and at the head of drainageways. These soils formed in calcareous loess and are similar to Elkhart, Fayette, and Rozetta soils. Slopes range from 5 to 10 percent in the petition area. The surface layer is a silty clay loam about 4 inches thick, and the subsoil 19 inches thick. The subsoil is composed of two layers: the upper layer is a silty clay loam, while the lower is a silt loam. The underlying material to 60 inches is a friable silt loam. Air and water move through at a moderate rate, runoff is medium and water capacity is high. Organic matter content is very low and the surface layer is only slightly acid due to liming. The subsoil is medium acid and tilth is low. The Sylvan soils in the petition area are severely eroded so most of the original surface layer is gone. Thus the plow layer consists of mainly subsoil, which tends to puddle and crust easily after rains. Most areas are cultivated despite this soil's poor suitability to cultivated crops. Sylvan soils cover 10.52 hectares (0.40 percent) of the petition site. They occupy 0.99 percent of the buffer, and 0.5 percent of Knox County.

Tama

The Tama series consists of moderately well drained, moderately permeable soils on uplands and stream terraces. Formed in loess, these soils are similar to Assumption, Downs, Elkhart, and Rozetta soils. Slopes in the petition area range from 1 to 15 percent. The surface layer ranges from 6 to 9 inches of silt loam, and the subsoil is a silty clay loam about 38 inches thick. The underlying material to a depth of 60 inches is silt loam. Air and water move through Tama soils at a moderate rate.

Surface runoff is medium, and seasonal high water table is 4 to 6 feet below the surface during spring. Available water capacity is very high and organic matter content is moderate. The surface layer is neutral and the subsoil slightly acid. The surface layer tends to crust after heavy rains. This soil is well suited for, and productive in, the cultivation of crops, pasture, and hay. By far the largest portion of the petition area is covered by Tama soils (1086.3 ha or 41.7%). The Tama series covers 27.0 percent of the buffer, and 24.9 percent of Knox County.

C. LAND CAPABILITIES

Capability Class and Subclass

Land capability classification is the grouping of soil mapping units chiefly on the basis of their capability to produce common cultivated crops and pasture plants without deterioration over a long period of time (Klingebiel and Montgomery 1966). Land capability classification is based on the aggregation of soil map areas, and gives some indication of similar potentials and primary limitations for crop and pasture production on various soil types. Capability designations simplify and condense soil map unit information. The risks of soil damage or limitation in use become progressively greater from Class I to Class VIII. Classes I to IV are generally considered to be land suitable for cultivation. Additionally, the lower-case letters indicate subclasses which have a similar major conservation problem: e=erosion and runoff, w=excess water, s=root zone limitations, and c=climate limitations (Olson 1981). The bulk of the information on the petition area's soil capabilities was compiled from the Knox County Soil Survey (Windhorn 1986). The land capability classes are defined as:

Class I.	Soils with few limitations that restrict their use.
Class II.	Soils with some limitations that reduce the choice of plants or require moderate conservation practices.
Class III.	Soils with severe limitations that reduce the choice of plants or require special conservation practices.
Class IV.	Soils with very severe limitations that restrict the choice of plants or require very careful management.
Class V.	Soils with little or no erosion hazards but with other limitations (like flooding) that restrict their use largely to pasture, rangeland, woodland or wildlife food and cover.
Class VI.	Soils with severe limitations that make them generally unsuited to cultivation and restrict their use largely to pasture, rangeland, woodland or wildlife food and cover.
Class VII.	Soils with very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland or wildlife.
Class VIII.	Soils with limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, water supply, or to aesthetic purposes.

The petition area has soils in six of eight classes, and two of four subclasses (Map 49). Of the 41 soil mapping units represented on the petition area, 38 have a capability class of III or better, with 23 having a II or better (Table 2 Appendix E). Map 50 shows soils of capability classes I and II overlaid on a satellite image of the petition area. Only Ipava and Clarksdale soils, accounting for 12.8 percent of the petition area, qualify with the highest capability class (Table 2 Appendix E). The major capability limitations on the other soils are due to erosion (e) and wetness (w).

The slope of land and poor drainage of some of the soils are the sources of these problems. Water erosion becomes a hazard for any land with a slope greater than 2 percent; this is especially true for areas, like those found in the petition area, where minimum permanent soil cover is present and where much of the surface soils consists of loess which is extremely erodable (K factor > 0.30). Erosion by water is very serious on the petition area as 34 percent of land in the petition area has a slope greater than 5 percent.

The erosion factor, K, indicates the susceptibility of a soil to sheet and rill erosion. Estimates are based primarily on silt, sand and organic matter percentage, and on soil structure and permeability. The higher the value, the more susceptible it is to water erosion. K factors range from 0.24 to 0.43 for the soils on the petition area, with most soils having K values in excess of 0.3 (Table 2 Appendix E). Erosion T value refers to the maximum average annual rate of soil erosion by wind or water (tons/acre/year) that can occur without affecting crop productivity over a sustained period. T values range from 2 tons/acre/year for the Atlas soil, to 3 for Assumption and Denny soils, on up to 4 and 5 for the remaining soils from the petition area (Table 2 Appendix E).

Wind erosion, though not as important as water erosion for soil loss, can also be significant during portions of the year when the area is not vegetated. Classes of wind erosion are based mostly on texture and indicate the susceptibility to soil blowing and the amount of soil lost; this is pertinent only in cultivated and devegetated areas. Wind erosion groups 3, 4, 5, 6, and 7 are represented on the petition area, and are defined as follows:

3. Highly erodible. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams.

4L. Erodible. Calcareous loamy soils that are <35 percent clay and >5 percent finely divided calcium carbonate.

5. Slightly erodible. Loam soils with <18 percent clay and <5 percent finely divided CaCO.

6. Very slightly erodible. Loam soils with 18 to 35 percent clay and <5 percent finely divided CaCO.

7. Very slightly erodible. Silty clay loams with <35 percent clay and <5 percent finely divided CaCO.

Alvin, with relatively high content of fine sand at the surface, is the soil most susceptible to wind erosion and is the only soil series in group 3 (Table 2 Appendix E). The Lenzburg series has a sizeable fraction of finely divided calcium carbonate near the surface and it is quite erodable from wind as the sole member of group 4L.

Atlas, Marseilles, and Coatsburg soils must be especially carefully managed to prevent topsoil erosion because their subsoil is ill-suited to plant growth; loss of topsoil results in substantial loss of productivity. The Coatsburg soils presently have a capability class of IIIe, while the Marseilles soils have a capability class of IVe. Unfortunately, the Atlas soil in the petition area has already been severely eroded and has a capability class of VIe. Sylvan soils, on the other hand, are also severely eroded but they have a well structured loess subsoil giving them a capability class of IVe. Wind erosion, in addition to water erosion, poses the most significant management problem for Alvin soils. With a capability class of IIIe, these soils are droughty (low capacity to store water) and, because of their high sandy loam content, are subject to soil blowing.

Sable and Sawmill soils, both nearly level soils classed as IIw, have a silty clay loam surface layer, so tilth can be a problem. Their soil structure is weakened by tillage, and they tend to crust during periods of heavy rain. Such a crust increases both the runoff rate and the soil's susceptibility to erosion. Sable, Sawmill, Keomah, and Denny soils require drainage systems. Without such drainage their natural wetness would make cultivation of crops nearly impossible. These soils have capability classes of IIw and IIIw, and qualify as prime farmland where drained.

A firm, clayey paleosol (buried soil) like that found in Assumption, Atlas, Coatsburg, and Elco soils tends to dam up water by restricting its downward seepage. If such a paleosol is found on a steep side slope the water will seep out horizontally from the side of the slope. This seepage causes wetness that may delay harvest and planting. None of these soils have a capability class above III, and all, because of their slope, are moderately eroded to severely eroded.

Five soils, Radford, Huntsville, Lawson, Orion, and Sawmill, are subject to flooding (Table 3 Appendix E). Radford soils flood occasionally for brief periods from March to May, and Sawmill soils flood frequently for brief periods from March to June. Huntsville soils flood occasionally for very brief periods from January to May, Lawson soils occasionally for brief to long periods from March to May, and Orion soils flood frequently for brief periods from March to May. The Orion and Sawmill soils need to be protected from flooding to qualify as prime farmland, while the others flood infrequently enough to qualify (Table 2 and 3 Appendix E).

Crop and Pasture Productivity

Because the soils in the petition area are highly productive, the area has 1523 hectares of cropland, with agriculture being the overwhelmingly dominate land use. Map 51 shows a distribution of cropland in the petition area as an overlay to the satellite image. Table 2 Appendix E shows the soil productivity indices under both basic and high levels of management. These data was compiled from Circular 1156 of the University of Illinois Cooperative Extension Service (Fehrenbacher et al. 1978) and the Soil Conservation Service document on important farmlands of Illinois (U.S. Department of Agriculture 1988). A productivity index is derived from a soil type's estimated yield of corn, soybeans, wheat, and oats under high levels of management. The greater the yield in the four crop categories, the higher the index. Since the level of management has such a pronounced effect of crop production, Table 2 Appendix E shows the estimated productivity indices under both basic and high levels of management. The basic level is defined as the minimum technological input necessary for crop production to be feasible and the high level includes inputs of current technology near those required for optimum production. The indices in Table 2 Appendix E were adjusted to account for reduced production due to erosion and slope phases of the soil series when necessary. The greater the erosion and slope, the lower the productivity index. Also, production indices were further decreased if subsoil was unfavorable to cultivation as is the case with Atlas, Coatsburg and Marseilles soils. Since no soils in the petition area have had total crop failures due to flooding in 3 out of 10 years, no adjustment for flooding was necessary. Map 52 displays the adjusted, high management productivity indices for petition soils.

Adjustment of productivity indices for slope and/or erosion was necessary for 34 of the 41 soil mapping units; even so, 61.38 percent of the land in the petition area has a productivity index of 120 or higher (see Map 53 showing productivity indices >120 overlaying the satellite image). The overall weighted mean productivity index for the petition area was 118; this is a very high index considering the proportion of the area with severe productivity limitations due to slope, wetness and previous mining. When only the soils of the petition area currently under cropland are considered, the weighted mean productivity index is 142, a very high value indeed.

Ipava soils, accounting for nearly 13 percent of the petition area, have the highest productivity index (160 at a high level of management). Tama soils, the most extensive soil type in the petition area covering nearly 42 percent, have productivity indices which range from 135 to 149 at a high level of management (Table 2 Appendix E). The range is due to varying degrees of slope and erosion of the soil units within the Tama series. Lenzburg mapping unit 871G has a productivity index of 0 because its steep slopes and rockiness make cultivation impracticable; 871B has a productivity index of 70, and a productivity index of 63 is given for 871D (Lohse, Illinois Department of Agriculture, personal communication 1990 and U.S. Department of Agriculture 1988). Other less productive soils in the petition area are Atlas, Hickory, and Coatsburg, with productivity indices at high management ranging from 0 to 77.

Table 4 Appendix E presents yield estimates for specific grain and hay crops for the soil mapping units found on the petition site. Corn and soybeans are by far the most common agricultural crops produced in the petition region. Yield estimates on petition soils for corn range from 163 bushels per acre for the Ipava series down to 72 for the Hickory silt loam, 10-15 percent slopes. The same soils have the high and

low estimates for soybeans, ranging from 52-23 bushels per acre. Eighteen of 41 mapping units covering 65 percent of the petition area can produce corn in excess of 120 bushels per acre and more than 35 bushels per acre of soybeans. Of course, the most steeply sloping and/or eroded soils are not rated for corn and soybean production because they are unsuitable for row crop production. These include Atlas silty clay loam, 10-18 percent slopes, severely eroded; Hickory silt loam 15-30 and Hickory loam 30-50 percent slopes, eroded; and Lenzburg silt loam, 10-20 and Lenzburg loam 20-70 percent slopes. Productivity data are also unavailable for Orthents, which are usually unsuitable for row crop production.

For wheat production, Ipava soils once again have the highest yield estimate at 66 bushels per acre. Several soil series can be nearly as productive as Ipava for wheat, though, including Littleton (62 bushels per acre), Sable (61) and Tama (61). Of those soils rated for wheat production, Atlas soils ranked the lowest at 15 bushels per acre (Table 4 Appendix E). Oat production follows similar patterns as wheat, ranging from 91-34 bushels per acres for Ipava and Atlas, respectively (Table 4 Appendix E).

Grass and legume hay production is feasible on all petition soils except those with G slopes and Orthents. Production estimates range from 6.1 tons per acre on Ipava soils to only 1.7 tons per acre on Atlas soils. Twenty-eight of 41 mapping units, covering nearly 70 percent of the petition area, can produce at least 4.0 tons per acre of hay (Table 4 Appendix E).

Land uses and soil suitabilities are generally well matched through trial and error and experience of the land managers. In fact, the most productive petition soils, Ipava and Sable, have the highest percentage of their areas devoted to crop production,

and in general this relationship holds true. However, some relatively less productive soils are used mostly for cropland (Assumption, Elkhart) while other highly productive soils are not (Radford, Rozetta) (Tables 5 and 6 Appendix E). Map 54, in fact, shows the noncropland areas with productivity indices greater than 120 on the satellite image to illustrate areas of potentially high productivity currently not being used for row crops. Nearly 300 hectares of the petition area with slopes greater than 5 percent are used for cropland. For a complete overview of soils and the land uses to which they are devoted, see Tables 5 and 6 Appendix E.

Prime Farmland

Prime farmland, as defined by the U.S. Department of Agriculture (1975), is the land best suited for production of food, feed, forage, fiber and oilseed crops. Prime farmland does, or has the potential to, produce the highest yields with minimum inputs of energy and economic resources, and in farming it results in the least damage to the environment. Prime farmland is identified with the following criteria (U.S. Department of Agriculture Committee on Land Use, 1975):

1. Soils have an adequate and dependable moisture supply.
2. Soils have a mean annual soil temperature at a depth of 50 cm (20 inches) higher than 0°C. In addition, the mean summer temperature at 50 cm is higher than 15°C.
3. Soils have a pH between 4.5 and 8.4 in all horizons within a depth of 1 m or in the root zone if the root zone is less than 1 m deep.
4. Soils have no water table or a water table that is maintained at a sufficient depth to allow crops common to the area to be grown.

5. Soils have in all horizons within a depth of 1 m or in the root zone if the root zone is less than 1 m deep, an exchangeable sodium percentage (ESP) of less than 15.
6. Soils flood less often than once in two years during the growing season.
7. Soils have a product of K (erodibility factor) x percent slope of less than 2. That is, prime farmland does not include soils having a serious erosion hazard.
8. Soils have a permeability rate of at least 0.06 inches per hour in the upper 50 cm.
9. Less than 10 percent of the surface layer in these soils consists of rock fragments coarser than 3 inches.

In the petition area, 65.36 percent of the soils (1,706 ha) qualify as prime farmland (Tables 1 and 2 Appendix E, Map 55). Map 56 shows the distribution of prime farmland on the satellite image. Of the 65.36 percent prime farmland, 1.09 percent (80.75 ha) requires draining and 0.34 percent (11.5 ha) requires protection from flooding to be classified as prime farmland. Comparatively, 4,959.4 hectares or 52.84 percent of the buffer are prime farmland soils, and 62 percent of Knox County is considered prime (Windhorn 1986), indicating the higher than average productivity of the petition area. Much of the remaining soils of the petition site do not qualify as prime farmland because their slope and erodibility factors have a product greater than two (criteria 7).

Certain soils are, however, recognized for their productive capability secondary to prime farmland soils. These are referred to as high capability land (62 Ill. Adm. Code 1701. App. A), and are defined as any nonprime soil unit with a land capability

class of III or higher, plus land capability classes IV with slopes less than 5 percent (excludes IVe). In addition to the prime farmland soils, 446.5 hectares, or 17.11 percent of the petition area are comprised of high capability soils; therefore, 82.47 percent of the petition site is occupied by prime farmland or high capability soils (Tables 1 and 2 Appendix E, Map 57). High capability soils are highlighted on the satellite image on Map 58. It is of interest to note that 35 percent of the previously mined Lenzburg and Rapatee soils qualify as prime farmland or high capability soils.

Woodland Capability

Since a portion (69.8 ha) of the petition area currently is in forest, with the potential for sizeable additional forested areas, it is important to discuss the suitability of each soil unit for woodlands, including timber production. Referencing Table 7 Appendix E, the ordination symbol indicates the potential productivity of the soils for important trees with the higher numbers indicating higher productivity. For the soils found on the petition area or the surrounding buffer, the ordination ranges from 2 for the lowest woodland productivity Orion soil to 7 for the highest productivity Camden soil. The majority of the soils found on the petition area and which had woodland information available (soils essentially 100 percent in cropland, like Ipava, Sable or Tama, had no woodland data available) had ordination symbols of 3 (moderate productivity) or 4 (moderately high productivity). The only exceptions were Orion on the low side (2 rating - moderate productivity), and Paxico (5 - moderately high), Sylvan (6 - high), and Camden (7 - high) on the high side. The associated letter with the ordination symbol indicates the major kind of soil limitation to woodland production In these soils, the letter A indicates little or no restriction to woodlands, while a W indicates excess water in the soil, a C indicates a problem with rooting due to excessive clay in the upper part of the soil, and a R

indicates steep slopes. For petition soils with rankings, only Atlas had a restriction due to the clay layer, while Hickory, Elco, and Lenzburg were restricted by steep slopes, and Sawmill and Orion were restricted by wet soils (Table 7 Appendix E). The productivity of the soils for deciduous and coniferous timber production is also presented (Table 4 Appendix E). The Fayette soils show the most potential productivity, with 360 board feet per acre per year. Elkhart and Camden soils are also very high. Many soils (row crop soils like Tama or Sable) do not have estimates, but would also be very productive for timber if that were the land use. Other soils, like Lenzburg, do not have data compiled as yet for yield estimates. The soils with the lowest productivity for deciduous forests, as reflected in Table 4 Appendix E, are the Hickory (G slope) and the Coatsburg soils. Patterns for coniferous forest production generally follow the same trends.

Regarding the management concerns reflected in Table 7 Appendix E, erosion hazard indicates the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, fire lanes and log-handling areas. Equipment limitation reflects the characteristics and conditions of the soil that restrict the use of equipment generally needed for woodland management or harvesting. The major criteria for this rating are slope, stones on the surface, rock outcrops, soil wetness and texture of the surface layer. Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings, assuming good planting stock and sufficient rainfall; factors considered here include texture of the surface layer, depth to a seasonal high water table, length of high water periods, rock fragments at the surface, effective rooting depth, and slope aspect. For windthrow hazard, the depth to bedrock or other limiting layer and the seasonal high water table determine the probability that trees will be uprooted by the wind during storm events. Common trees are those merchantable trees often

existing on a soil unit which are generally favored by woodland managers because of growth rate, quality, value and marketability. Trees to plant are those suited to the soils and to commercial wood production.

Upon evaluation of the soils of interest, most of the Hickory and Elco, all of the Alvin, Camden, Rozetta, Fayette, Downs, Dorchester, Marseilles, Paxico, and some of the Lenzburg soils have only slight limitations to be considered for woodland management (Table 7 Appendix E). The only soils with severe limitations are the steep (G) slopes of the Hickory and Lenzburg soils; those slopes cause severe problems from soil erosion and for equipment use. The Sawmill and Atlas soils have moderate restrictions for seedling mortality and windthrow hazard due to their shallow effective rooting zones. The recommended trees to plant or common trees found on these soils follow the general trend of red and white oak, hickory, and walnut on the uplands and cottonwood, pin oak, sycamore, sweetgum, and silver maple on the bottomland soils (Table 7 Appendix E). Site index class and productivity ratings generally follow similar trends as those discussed regarding ordination symbols. Estimates of board feet per acre yields of deciduous timber and cords per acre of coniferous timber are given for most petition soils in Table 4 Appendix E.

Recreation

Although the region under consideration does not have a great deal of recreation resources, it is important to discuss the feasibility of the soils for such purposes. Table 8 Appendix E presents the suitability of each of the soil units for camping areas, picnic areas, playgrounds, paths and trails, and golf fairways. Of all soil units tabulated, none had a suitability rating of slight for all five recreation types.

However, several soil series had very high suitabilities, including Downs, Elkhart, Fayette, Rozetta, and Tama, which had soil units with only one rating of moderate (moderate playground restriction due to slope). On the other extreme, 11 soil units had severe suitability ratings for all five recreation types (Table 8 Appendix E). The Atlas, Coatsburg, Denny, Sable, and Sawmill soils had severe restrictions due to wetness or ponding attributes, whereas the steeper slope phases of Elco, Hickory, and Lenzburg were severely restricted for all recreation uses due to excessive slopes. Most of the other units have slight or moderate restrictions on picnic areas, paths, and golf fairways, whereas the slope is sufficiently excessive to severely restrict campgrounds and playgrounds on many of the soils.

Wildlife Habitat Suitability

The kind and abundance of wildlife present on a site is determined by the amount and distribution of food, cover, and water available to wildlife within the area. The landscape attributes of the area, especially the soil resources, determine the potential for maintaining, improving, or creating additional wildlife habitat. In Table 9 Appendix E, the soils of the petition and buffer areas are rated for their capability to provide habitat for various kinds of wildlife. This information can be used to determine the intensity of management needed for each habitat element and the feasibility of creating or improving various developments for wildlife. Good potential for wildlife does not necessarily indicate that the soil is currently productive in that particular habitat element. Six different habitat elements have been rated. Soil properties affecting growth of grain and seed crops are depth of root zone, texture of surface, available water capacity, wetness, slope, surface stoniness and flood hazard. Clarksdale, Denny, Downs, Elkhart (B, C slopes), Fayette (B), Huntsville, Ipava, Keomah, Lawson, Lenzburg (B), Orion, Radford,

Rapatee, Rozetta, Sawmill, and Tama (B) all rate good for the suitability for producing grain and seed crops. Only Elco (E), Hickory (E,G), and Lenzburg (D,G), rate poorly due to excessive slopes. Similar soil characteristics affect suitability for grass and legume and wild herbacious plants, only that the tolerances for any particular limitation are generally greater. As such, the ratings are generally higher for these two categories; only two 'poor' ratings were given to soil units for grass and legume suitability and none for production of wild herbacious plants.

The suitability for hardwood trees is dependent on the soil wetness, available water capacity, and depth of the root zone. In our case, all the soils rated good or fair, with the fair ratings generally going to wet soils (Table 9 Appendix E). The inverse is true for the suitability for wetland plants or shallow water areas: only those soils, like Denny, Orion, Sable, and Sawmill, which are level and with high water tables are suited for these types of habitat elements.

The openland wildlife habitat rating is based on the ratings for grain and seed, grass and legumes, wild herbacious plants, hardwood trees and shrubs, and conifer plants. Openland wildlife include pheasants, meadowlarks, field sparrows, cottontails, doves and red foxes. Most of the petition area's soils have good ratings for openland wildlife; excessive slope is the major factor detracting from the good rating for Elkhart, Hickory, and Lenzburg soils (Table 9 Appendix E). Woodland wildlife habitat ratings are based on all the habitat element rankings except for grain and seed crops. Woodland wildlife include woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoons and deer. Once again, most all of the petition area rates good for this wildlife type. Only the Dorchester soil, found insignificantly in the buffer area but not in the petition area, rated poorly for woodland wildlife. Wetland habitat ratings are based on ratings of wetland food and cover plants, marshes, and shallow

impoundments. Wetland wildlife include ducks, geese, herons, shore birds, muskrats, frogs, turtles and snakes. Naturally, the poorly drained bottomland soils (Lawson, Orion, Paxico, Radford, and Sawmill) and depressional soils (Denny and Sable) rank good or fair for wetlands and the better drained alluvial or upland soils rank very poor.

Engineering Suitabilities

Suitabilities for engineering purposes in community development are presented in Tables 10 and 11 Appendix E. Rankings are given for each soil unit with respect to their potential as source material for roadfill or topsoil, and suitability for shallow excavations, dwellings with or without basements, small commercial buildings, local roads and streets, lawns and landscaping, septic tank absorption fields, sewage lagoon areas, sanitary landfills, and for providing daily cover for landfills. A slight rating indicates favorable conditions to development, a moderate rating indicates not favorable but the limitations can be overcome with design and/or planning, and a severe rating indicates that significant increases in construction costs as well as special feasibility studies will be necessary for development. Once again, excessive slopes and excessive wetness, along with excessive shrink-swell potential, were the primary factors limiting to community development criteria for the soils of the petition area (Tables 10 and 11 Appendix E). As such, none of the soils rank particularly well for community development as a whole. To get some idea of the variation among soil units, a simple summation was performed on the nine community development criteria, where a slight limitation was given 3 points, a moderate 2 points, and a severe 1 point. The maximum possible number of points was therefore 27, the minimum 9. The highest soil unit resulting from this exercise was Elkhart (B,C) with 22 points, followed by Fayette (B,C) and Sylvan with 21

points. Other soil units averaging with moderate limitations (17-18 points) include Assumption (C), Downs, Fayette (D), Lenzburg (B), Rapatee, Rozetta, and Tama (B,C). On the other side of the spectrum, those soil units with unacceptable limitations for community development (9-10 points) include Atlas, Clarksdale, Coatsburg, Denny, Dorchester, Elco (E), Hickory (E,G), Ipava, Jules, Lawson, Lenzburg (D,G), Littleton, Orion, Paxico, Radford, Sable, and Sawmill.

Soil Genesis, Water and Corrosivity of Soils

As shown in Table 3 Appendix E, the majority of soils from the petition and buffer area formed in wind-blown loess deposits on upland sites. Eight soils, however, formed in bottomland alluvial deposits, and the Lenzburg and Rapatee soils formed in a regolith of surface mined materials. Each of the bottomland soils are subject to brief periods of flooding during the spring months, although the flooding duration may be long for the Lawson soils on occasion. Many of the soils are also prone to high water tables during the spring months, either via perched or apparent water. Almost all the soils are subject to frost heaving. The corrosivity of the soils to steel or concrete varies widely, but are generally highly corrosive to steel and moderately corrosive to concrete.

Soil-forming Factors

Soil formation varies as the following five main factors vary: parent material, plant and animal life in the soil, climate, topography, and length of time these forces have acted upon the soil (Jenny 1961). Most of the following is a composite of information from the Jenny paper and information found in the Knox County Soil

Survey (Windhorn 1986). Soil genesis information and taxonomy are summarized in Tables 1 and 3 Appendix E.

Parent Material. Almost all the parent materials in Knox County and the petition area are of glacial origin. The most widespread of these materials are glacial till, glacial outwash, alluvium and loess. In the few areas where this overlying material was removed, soils formed from shale and siltstone. Surface mining has created a new type of parent material, which involves soils such as the Lenzburg and Rapatee series. In some areas (Atlas and Assumption soils) a very firm, clayey buried soil exists. This soil formed during the Sangamonian Stage, and was later buried by loess during the Wisconsonian Stage.

Most of the upland soils in the petition area formed in loess, which is made up of calcareous silt-sized particles that were deposited by the wind. The loess in Knox County ranges from 7 to 16 feet in thickness. Alvin soils formed in sandy outwash deposited by running water from melting glaciers, and later carried by the wind to its modern day location. Alluvial sediments are found along streams because they are usually deposited during stream overflow; examples include the Sawmill, Lawson, and Radford soils.

Plant and Animal Life. Some of the soils in the petition area formed under tallgrass prairie, and others under deciduous hardwood forests. Ipava, Sable and Tama soils formed under prairie vegetation. The many fibrous roots of grasses added quantities of organic matter to the soil as did fallen tree leaves. Bacteria and fungi helped break down and compose organic matter into humus, and burrowing animals (earthworms and squirrels) helped incorporate the humus into the soil.

Climate. The petition area has a temperate, humid, continental climate. Climate is important because the water moving through the soil dissolves minerals and then carries them, along with clay, downwards. The amount of precipitation as well as the period of time the ground remains frozen affects how much water will move through the soil. Frozen ground increases runoff, so the longer the weather remains below freezing the less this percolation of water through the soil will occur.

As the climate in the petition area is suited for tall prairie and deciduous hardwoods which in turn affect soil formation, climate acts indirectly upon the soil through the vegetation it promotes.

Topography. Slope influences many different factors of soil formation. The greater the slope the greater the runoff and erosion hazards. On the other extreme, soils with no slope at all are often poorly drained, and prone to ponding from the runoff of adjacent sloping areas. Soils with high runoff are less developed because less water percolates through, and soils with no slope often have a high water table because of their poor drainage. This high water table also cuts down on the amount of percolation because the water does not have as far to go.

Time. In general, older soils are better developed than younger soils because the above processes have been acting upon the soils longer, creating distinct horizons and leaching the upper layers of certain minerals, like calcium carbonate. However, erosion can undo years of soil development, and older, eroded soils may have some of the characteristics of a younger soil because so much of the surface soil has eroded away.

CHAPTER VII

BIOLOGICAL RESOURCES

A. VEGETATION

High Value Vegetation Components

Endangered, Threatened and Rare Plants

The principal area of investigation is in Knox County. The buffer zone around the principal area of investigation include portions of Fulton, Knox and Peoria counties.

Fulton County. Thirteen state-endangered plants (*Asclepias meadii, Boltonia decurrens, Carex laciculmis, Carex pallescens, Carex styloflexa, Habenaria leucophaea, Plantago cordata, Poa autumnalis, Poa wolfii, Polygala incarnata, Scheuchzeria palustris, Sparganium americanum, Trifolium reflexum*) and one state-threatened plant (*Veronica scutellata*) have been found in Fulton County. Three Federally threatened species (*Asclepias meadii, Boltonia decurrens, Habenaria leucophaea*) and one Federal candidate species (*Aster furcatus*) have been found in Fulton County.

Knox County. Three state-endangered plants (*Cypripedium reginae, Habenaria leucophaea, Sparganium americanum*) and one state-threatened plant (*Aster schreberi*) have been found in Knox County. One of these species, *Habenaria leucophaea* is also a Federally threatened species.

Peoria County. Twenty seven state-endangered plants (*Agropyron subsecundum, Arctostaphylos uva-ursi, Asclepias meadii, Camassia angusta, Carex communis, Carex intumescens, Carex laxiculmis, Chamaesyce polygonifolia, Cypripedium candidum, Cypripedium reginae, Gaultheria procumbens, Glyceria canadensis,*

Habenaria flava, Habenaria leucophaea, Microseris cuspidata, Mimulus glabratus, Orobanche fasciculata, Plantago cordata, Poa wolfii, Polygala incarnata, Phamnus alnifolia, Sabatia campestris, Scirpus smithii, Spiranthes romanzoffiana, Trifolium reflexum, Veronica americana, Viburnum molle) and nine state-threatened plants (*Artemisia dracunculus, Aster schreberi, Calopogon tuberosus, Epilobium strictum, Filipendula rubra, Oryzopsis racemosa, Rhynchospora alba, Scirpus polyphyllus, Veronica scutellata*) have been found in Peoria County. Three Federally threatened species (*Asclepias meadii, Boltonia decurrens, Habenaria leucophaea*) and three Federal candidate species (*Aster furcatus, Plantago cordata, Rhus trilobata var. arenaria*) have been found in Peoria County.

According to our knowledge, none of these species have ever been found within the principal area of investigation or the buffer zone around that area. Habitat for these species does not occur in the petition area.

<u>Community Classification</u>

Terrestrial Vegetation Analysis

The project is located in the Western Forest-Prairie Natural Division, Galesburg Section. Floristically this division is characterized by the following principal natural features.

Forest: Dry upland, mesic upland, floodplain
Prairie: Dry, mesic, wet

Within the petition area, most of these natural features have been destroyed or degraded by agriculture and mining. For example, no prairie communities occur

within the petition area. Most of the vegetation in their area is highly disturbed and dominated by exotic plant species.

Pasture -- Most pastures were dominated by *Bromus inermis* (awnless brome grass), while other pastures might also be dominated by *Festuca pratensis* (meadow fescue) and/or *Poa pratensis* (Kentucky bluegrass). Scattered in many of these pastures were very young regrowth to young second-growth *Populus deltoides*. Unmined pastures frequently have *Prunus serotina, Quercus macrocarpa*, and *Quercus velutina*. These pastures may also include shrubland areas.

occasional trees:	*Acer saccharinum, Gleditsia triacanthos, Robinia pseudoacacia*
occasional shrubs:	*Maclura pomifera, Morus alba, Juglans nigra, Rosa multiflora*
occasional herbs:	*Ambrosia artemisiifolia, Ambrosia trifida, Asclepias syriaca, Conium maculatum, Eupatorium altissimum, Rumex* sp., *Scirpus atrovirens, Setaria faberi, Solidago canadensis, Sporobolus asper, Vernonia missouriense, Verbascum thapsus, Verbena stricta*

Hayfield -- Most hayfields were dominated by *Medicago sativa* (alfalfa) or *Festuca pratensis*. These fields may also occasionally include weedy forbes such as *Abutilon theophrastii, Amaranthus sp., Bromus inermis*, and *Datura stramonium*.

Corn stubble -- These areas and other cultivated areas included grass drainage ways dominated by *Bromus inermis, Festuca pratensis*. Occasionally these drainage ways were dominated by shrubby growths of *Acer negundo* (box elder) and *Salix nigra* (black willow).

occasional herbs:	*Ambrosia trifida, Asclepias syriaca, Conium maculatum, Galium aparine, Pastinaca sativa, Polygonum* sp., *Setaria faberi, Solanum carolinense*

Barren -- Although mostly unvegetated, these areas occasionally included vegetated areas dominated by *Bromus inermis* and a few saplings of *Morus alba, Populus deltoides*, and *Robinia pseudoacacia*

Forest -- Very young regrowth to young second-growth Mesic upland and floodplain forest. These forest were heavy to very severely grazed.

A. Very young regrowth to young second-growth mesic upland forest that are heavily to very severely grazed.

dominant trees:	*Celtis occidentalis* (hackberry), *Ulmus rubra* (slippery elm)
dominant shrubs:	*Celtis occidentalis, Ribes missouriense* (Missouri gooseberry)
dominant herbs:	*Bromus inermis, Eupatorium rugosum* (white snakeroot)
occasional trees:	*Acer saccharum, Carya ovata, Gleditsia triacanthos, Juglans nigra, Maclura pomifera, Morus alba, Populus deltoides, Prunus serotina, Quercus alba, Quercus imbricaria, Quercus rubra, Quercus velutina, Tilia americana*
occasional shrubs:	*Celtis occidentalis, Crataegus mollis, Ostrya virginiana, Rosa multiflora, Rubus occidentalis, Ulmus rubra,*
occasional herbs:	*Agastache nepetoides, Carex sp., Elymus virginicus, Galium aparine, Geum canadense, Leonurus cardiaca, Poa pratensis*
vines:	*Vitis* sp.

B. Very young regrowth to young second-growth floodplain forest that are moderately to very grazed.

dominant trees:	*Acer negundo, Acer saccharinum* (silver maple), *Salix nigra, Ulmus americana* (American elm)
dominant shrubs:	*Ribes missouriense, Sambucus canadensis* (common elder)

dominant herbs:	*Ambrosia trifida* (giant ragweed), *Geum canadense*, (white avens), *Elymus virginicus* (Virginia wild rye), *Phalaris arundinacea* (reed canary grass)
occasional trees:	*Celtis occidentalis, Gleditsia triacanthos, Maclura pomifera, Morus alba, Platanus occidentalis, Quercus macrocarpa*
occasional shrubs:	*Acer negundo, Juglans nigra, Maclura pomifera, Rosa multiflora, Rubus occidentalis, Symphoricarpos orbiculatus*
occasional herbs:	*Alliaria petiolata, Arctium minus, Bromus inermis, Campanula americana, Dioscorea* sp., *Galium aparine, Leersia oryzoides, Conium maculatum, Elymus canadensis, Eupatorium rugosum, Leonurus cardiaca, Osmorhiza longistylis, Phlox divaricata, Silphium perfoliatum, Solidago canadensis, Urtica dioica, Verbena urticifolia, Viola* sp.
vines:	*Parthenocissus quinquefolia, Vitis* sp.

Scrub-shrub -- These sites are dominated by thorny species in those areas being pastured (grazing was heavy to very severe) and non-thorny species in those areas not being pastured. The pastured areas also tended to have a poorly developed herbaceous layer while the non-grazed areas were typically planted in Bromus inermis. In at least one site this community developed in an over-grazed oak woods with widely spaced *Carya ovata, Quercus alba, Quercus rubra, Quercus velutina*, and *Tilia americana.*

dominant shrubs:	*Populus deltoides* (cottonwood), *Ribes missouriense, Robinia pseudoacacia* (black locust), *Rosa multiflora* (multiflora rose), *Ulmus americana.*
dominant herbs:	*Bromus inermis*
occasional shrubs:	*Acer negundo, Fraxinus americana, Juglans nigra, Maclura pomifera, Morus alba, Quercus imbricaria*
occasional herbs:	*Ambrosia trifida, Arctium minus*

Wetland Vegetation Analysis

Palustrine Forested Wetlands -- Very young regrowth to young second-growth floodplain forest that are moderately to very severely grazed.

dominant trees:	*Acer negundo, Acer saccharinum* (silver maple), *Salix nigra, Ulmus americana* (American elm)
dominant shrubs:	*Ribes missouriense, Sambucus canadensis* (common elder)
dominant herbs:	*Ambrosia trifida* (giant ragweed), *Geum canadense,* (white avens), *Elymus virginicus* (Virginia wild rye), *Phalaris arundinacea* (reed canary grass)
occasional trees:	*Celtis occidentalis, Gleditsia triacanthos, Maclura pomifera, Morus alba, Platanus occidentalis, Quercus macrocarpa*
occasional shrubs:	*Acer negundo, Juglans nigra, Maclura pomifera, Rosa multiflora, Rubus occidentalis, Symphoricarpos orbiculatus*
occasional herbs:	*Alliaria petiolata, Arctium minus, Bromus inermis, Campanula americana, Dioscorea* sp., *Galium aparine, Leersia oryzoides, Conium maculatum, Elymus canadensis, Eupatorium rugosum, Leonurus cardiaca, Osmorhiza longistylis, Phlox divaricata, Silphium perfoliatum, Solidago canadensis, Urtica dioica, Verbena urticifolia, Viola* sp.
vines:	*Parthenocissus quinquefolia, Vitis* sp.

Palustrine Unconsolidated Bottom Wetland -- These wetlands are open ponds with marginal vegetation and are dominated in the shrub layer by *Salix nigra* and in the herb layer they are dominated by *Typha latifolia* and *Echinochloa crusgalli.*

occasional shrubs:	*Salix exigua, Salix interior*

occasional herbs: *Bidens* sp., *Eleocharis* sp., *Oenothera biennis, Panicum dichotomiflorum, Polygonum lapathifolium, Typha angustifolia*

Palustrine Emergent Wetland -- These wetlands are dominated by *Agrostis alba, Polygonum pensylvanicum, Scirpus atrovirens,* and *Typha latifolia.*

occasional shrubs: *Salix interior*

occasional herbs: *Abutilon theophrastii, Ambrosia artemisiifolia, Aster* sp., *Bidens* sp., *Cyperus* sp., *Eupatorium serotinum, Humulus lupulus, Phalaris arundinacea, Polygonum persicaria, Solidago canadensis, Verbena sp., Vernonia missurica, Xanthium strumarium*

Palustrine Scrub-shrub Wetland -- These wetlands are dominated in the shrub layer by *Salix exigua* and *Salix nigra*, in the herb layer they are dominated by *Phalaris arundinacea.*

occasional shrubs: *Acer negundo, Acer saccharinum*

Riverine -- The riparian vegetation along the riverine wetlands were dominated by *Acer negundo, Acer saccharinum, Populus deltoides*, and *Salix nigra* in the canopy with *Acer negundo, Rosa multiflora*, and *Ulmus americana* dominant in the shrub layer. The herbaceous layer was dominated by *Bromus inermis* and *Elymus virginicus.*

common trees: *Ulmus americana*

occasional trees: *Celtis occidentalis, Crataegus mollis, Gleditsia triacanthos, Juglans nigra, Maclura pomifera, Ulmus pumila*

occasional shrubs: *Rubus* sp., *Salix exigua*

herbs:	*Ambrosia trifida, Echinochloa crusgalli, Helianthus tuberosus, Phytolacca americana*
vines:	*Vitis* sp.

Lacustrine -- The vegetation along lacustrine wetlands were poorly developed. These lakes generally had very steep shores. Occasionally large patches of *Typha latifolia* were observed along the edge of these lakes in shallow water.

Land Cover

In addition to vegetation communities discussed previously, general land cover of the petition area was mapped for a 36-section buffer area, including the petition area surrounded by one section on all sides (same as the buffer area referred to in Chapter VI). Land cover was derived from SPOT satellite imagery collected in June, 1989, with field verification done in March, 1990.

The petition area is predominantly cropland, with 1522.86 hectares or 58 percent (Table VII-1, Map 59). Map 51 shows cropland areas highlighted on the satellite image. Grassland of varying quality, ranging from highly productive legume hayland to nearly barren, highly sloping, unimproved pasture on historically mined areas accounts for 1001.66 hectares or 38.2 percent of the petition area. About 48 hectares, or 4 percent, of the grassland area is water bodies as shown on the Knox County Soil Survey maps.

TABLE VII-1

LAND USES OF THE PETITION AND BUFFER AREAS

Land Use	Petition Area Hectares	Petition Area Percent	Buffer Area Hectares	Buffer Area Percent
Pasture, hayland and other grassland	1001.66	38.2	3823.26	40.8
Cropland	1522.86	58.0	4114.44	43.9
Woodland, shrubland and savanna	69.84	2.7	957.45	10.2
Barren and mined-out	10.17	0.4	121.55	1.3
Built-up, urban farmsteads	19.78	0.8	359.59	3.8
TOTAL	2624.31		9376.29	

Woodland covers 69.84 hectares or 2.7 percent of the petition area. As with grassland, woodland density and quality varies a great deal. Included in this category are scrub/shrub areas on previously mined land, if woody vegetation density exceeded about 50 percent of the area. Very little of the forests in the petition area have undisturbed understories.

Barren areas are mostly the result of recent mining, and cover 10.17 hectares or 0.4 percent of the area. Built-up areas include towns and farmsteads. They account for 19.78 hectares or 0.8 percent of the petition area.

Land cover of the buffer area was mapped to give indication of whether the petition site was typical of the region and to show what land cover in the region could be impacted by mining activities (Table VII-1, Map 59). For the same five land cover

categories, the buffer area is 43.9 percent cropland, 40.8 percent grassland, 10.2 percent woodland, 3.8 percent built-up, and 1.3 percent barren. The most significant difference between the petition area and the buffer is that the buffer has considerably more woodland. The petition area and buffer area are not typical of Knox County as a whole, though, because of the history of mining in this area. Knox County is 71 percent cropland and has significantly less grassland (typically found on mined land) than the petition and buffer areas.

B. WILDLIFE

Species/Habitat Relationships

The species of wildlife (vertebrates) known or likely to occur in the petition area are listed in Appendix F. In the following sections, the major taxonomic groups of vertebrates are discussed separately in relation to the types of habitat present within the petition area.

Mammals

Of the 62 species of mammals that may occur in Illinois (Hoffmeister 1989), the 33 species listed in Appendix F: Table 1 are likely to occur within the petition area. These species are known from Knox County or have ranges that include Knox County (Hoffmeister 1989; IFWIS; INHD). Only species for which suitable habitat was observed within the petition area during a field reconnaissance in January 1990 are included.

Much of the land within the petition area is crop fields, hayfields or pasture; narrow, wooded riparian corridors and surface-mine ponds are also present. Many larger mammals are habitat generalists and typically occur in such a mosaic of agricultural land and small wooded areas. Examples are the opossum, striped skunk, coyote, raccoon and white-tailed deer. Several grassland species of small mammals are tolerant of disturbed conditions and the proximity of humans, and also use such habitat. These include the thirteen-lined ground squirrel, prairie and meadow voles, and deer mouse. The Old World house mouse and Norway rat are commonly found in association with humans, although the house mouse will also venture into natural habitats. Several species of bats could utilize the petition area during the summer, roosting either in trees (in the foliage, in cavities or behind loose bark) or buildings. Bats are migratory and individuals from the petition area probably would spend the winter elsewhere, most hibernating in caves or mines. Some big brown bats could hibernate in buildings within the petition area if appropriate microclimatic conditions existed. Surface-mine ponds provide habitat for the muskrat and mink. Because trees are not present around the ponds in the petition area, the beaver is less likely to occur there. Mammals with relatively specialized habitat preferences for forested habitat, such as the chipmunk, gray squirrel and gray fox, are less likely to occur within the petition area even though their ranges include Knox County.

Birds

Of the 396 extant species of birds that have been reliably reported as occurring in Illinois (Bohlen 1989), 290 species have been recorded within the Fulton, Knox, and Peoria county area (Appendix F: Table 2). Scientific names for all bird species included in this section are listed in the Check-list of North American Birds (American Ornithologist's Union 1983). Most of the bird species recorded from

Fulton, Knox and Peoria counties were documented during migration seasons (IFWIS); however, migrant bird species are known to use a variety of stop-over and wintering habitats that otherwise would not be suitable for breeding.

A positive attribute of the petition area, with respect to migrants, is its relatively large expanse of habitat which has been free from recent major disturbance. Habitats within the petition area have been degraded badly by past surface mining and clearing for agriculture, but biological succession has produced a mosaic of grasslands and woodlots, surface-mine ponds, and narrow wooded riparian corridors that provide migration habitat for many passerines, raptors, waterfowl, shorebirds, and waders (Appendix F: Table 2). This habitat does not have the same quality as presettlement conditions in that vegetive diversity is low and the majority of the habitats are grassland/pasture and row crops. Perhaps the most important habitats with respect to migrating birds within the petition area are the ponds and the grassland/woodland mosaics.

The creation of surface-mine ponds has attracted waterfowl, shorebirds, and some waders to the petition area as in other areas (O'Leary 1984). The presence of water on reclaimed surface-mined land has been associated with an increase in avian diversity (Karr 1968). Waterfowl using the Mississippi and Illinois river flyways rest and forage in these ponds. Shorebirds and waders hunt for prey in the shallows and along the waters edge.

The low diversity grasslands created by past reclamation and current nonfarming practices are generally poor breeding habitat for all but a few bird species (Pentecost and Stupka 1979). However, these expansive grasslands, along with small interspersed woodlots, provide raptors such as red-tailed hawks, rough-legged

hawks, northern harriers, short-eared owls, with important foraging and wintering habitat. They also provide migrant species of raptors, swallows, and native sparrows with open habitats to rest and forage for small mammals, insects, and seeds.

The 69 bird species listed in Table VII-2 have been recorded within two 10-square-mile breeding bird atlas blocks (see Quality of Data Base) immediately adjacent to the petition area (Map 60). Most of these species are typical representatives of the habitat present and are likely to occur within the petition area. An additional 31 species have been recorded in a buffer zone of one 7.5' USGS quadrangle map border around the petition area (Appendix F: Table 3 and Map 60). Suitable to marginal breeding or foraging habitat for most of these 100 species occurs locally within the petition area.

TABLE VII-2

BREEDING STATUS OF BIRD SPECIES

Species	Farmington West 1987	Yates City 1988
Canada goose	PO	----
Turkey vulture	OB	----
Red tailed hawk	PO	OB
American kestrel	----	PO
Ring-necked pheasant	PO	PR
Northern bobwhite	CO	PR
Killdeer	PO	PO
Spotted sandpiper	PO	----
Rock dove	OB	PO
Mourning dove	OB	PR
Black-billed cuckoo	PO	----
Yellow-billed cuckoo	PO	PR
Eastern screech-owl	CO	----
Chimney swift	PO	PO
Red-headed woodpecker	CO	PR
Red-bellied woodpecker	OB	CO
Downy woodpecker	OB	PR
Hairy woodpecker	OB	PR
Northern flicker	PR	PR
Eastern wood-pewee	PO	PR
Eastern phoebe	PO	PR
Great crested flycatcher	PO	PR
Eastern kingbird	CO	CO
Horned lark	CO	PR
Purple martin	CO	----
Tree swallow	CO	----
Northern rough-winged swallow	CO	PO
Bank swallow	----	CO
Cliff swallow	OB	----
Barn swallow	CO	PR
Blue jay	PO	PO
American crow	PO	CO
Black-capped chickadee	PO	PR
Tufted titmouse	PO	PR

(Table concluded on following page)

Table VII-2 Concluded.

Species	Farmington West 1987	Yates City 1988
White-breasted nuthatch	OB	PO
House wren	CO	PR
Eastern bluebird	CO	PR
Wood thrush	PO	PR
American robin	CO	PR
Gray catbird	CO	CO
Northern mockingbird	----	CO
Brown thrasher	PR	PR
Cedar waxwing	CO	----
European starling	CO	CO
Yellow-throated vireo	PO	PR
Warbling vireo	PO	PR
Red-eyed vireo	PO	----
Black-and-white warbler	----	PO
Common yellowthroat	PO	CO
Scarlet tanager	OB	----
Northern cardinal	PO	PR
Rose-breasted grosbeak	PO	CO
Indigo bunting	PR	PR
Dickcissel	PO	CO
Rufous-sided towhee	PO	PR
Chipping sparrow	PO	PR
Field sparrow	OB	PR
Vesper sparrow	----	PR
Grasshopper sparrow	PO	PR
Song sparrow	PR	PR
Red-winged blackbird	CO	CO
Eastern meadowlark	PO	CO
Western meadowlark	----	PR
Common grackle	CO	CO
Brown-headed cowbird	OB	PR
Orchard oriole	PO	----
Northern oriole	PR	PR
American goldfinch	OB	PO
House sparrow	CO	CO

Breeding confirmation codes: OB = observed within the altas block;
PO = possible breeding within atlas block;
PR =probable breeding within atlas block;
CO = confirmed breeding within atlas block.

Breeding status of bird species observed during the 1987 and 1988 Illinois Breeding Bird Atlas projects conducted for the Yates City and Farmington West topographic quadrangle map areas. Data in this table taken from the Illinois Breeding Bird Atlas database (IDOC)

Reptiles and Amphibians

Thirty-nine species of amphibians and 59 species of reptiles may occur in Illinois (Morris et al. 1983), although the majority of these have limited ranges within the state (Smith 1961). The petition area lies within the "Western Woodlands" herpetofaunal division, the woodlands and riparian forests of which are considered remarkable for their depauperate herpetological communities (Smith 1961). Apparently suitable habitat occurs in this region, but many forest species occurring in adjacent divisions are absent. Relatively common species in this division are the northern cricket frog, striped chorus frog, northern leopard frog, green frog, common garter snake and milk snake, although these are all more abundant elsewhere in the state (Smith 1961). Several species have ranges that include the Illinois River Valley which borders the Western Woodlands Division, but do not extend as far as the petition area.

The petition area lies within the known geographical ranges of 15 species of amphibians and 30 species of reptiles (Smith 1961; Conant 1975; Schramm and Nordgren 1977; Frankland 1980; Brown and Morris 1990). Those species for which suitable habitat appears to be present within the petition area are listed in Appendix F: Table 4. Some of these species, however, are relatively rare and would not necessarily be present in the area (Smith 1961). Numerous surface mine ponds and small headwater streams may provide suitable habitat for ten species of amphibians, five turtles, and two water snakes. An additional water snake not known from Knox County, the diamondback water snake (*Nerodia rhombifera*), may occur within the petition area, but the identification of this species has not been confirmed. Aquatic species which inhabit large rivers (e.g. map turtle) or fast-flowing streams (e.g. false map turtle, queen snake) would probably not be found within the petition area. The

farmsteads, pastures, hayfields and edges of the wooded riparian corridors of the petition area potentially provide suitable habitat for 12 species of terrestrial snakes. These are primarily species which originally inhabited prairies or forest edges. The rat snake and timber rattlesnake are known from Knox County, but these species prefer forested bluffs and rock outcrops and would be unlikely to occur within the petition area. Few species of lizards occur in Illinois; the petition area may be within the range of the slender glass lizard and the five-lined skink. Suitable habitat for these species may be present, but the former species is extremely rare in Illinois and the latter is found primarily in the southern half of the state (Smith 1961).

Fishes

Of the 202 species of fishes known to occur in Illinois waters (Burr et al. 1988), 43 species have been collected from Spoon and/or Illinois River tributaries which drain the Galesburg section of the Western Forest-Prairie Division in Fulton, Knox and Peoria counties. Tables VII-3 and VII-4 list the species and numbers of individuals preserved from each of the 34 sites (Map 61) sampled by INHS and IDOC personnel from 1959 to 1980; complete locality information is presented in Appendix F: Table 5. Those streams with headwaters draining the project area are indicated by an asterisk. Scientific and common names of all fishes discussed in this report are taken primarily from Robins et al. (1980). Exceptions include those reported in the recent taxonomic revisions of Lundberg (1982), Mayden (1989), and Mayden and Gilbert (1989).

In order to understand general fish distribution and abundance it is necessary to realize that each species has its own specialized complex of ecological niches or habitats, the sum total of which comprises its environment. This causes certain

species to be predictably arranged in those stream systems which have a graded series of conditions (habitats) from source to mouth (Shelford 1911, Trautman 1981). Beginning at the sources of the streams, these habitat-specific species are usually limited in their occurrence to a specific set of habitats or to a certain size of stream. Although many species are found in streams of varying sizes, one usually can determine the approximate size of a stream by its species composition and, conversely, the species composition of a stream if the stream size and habitat characteristics are known.

The streams draining the petition area are classified as headwaters; therefore only those species that inhabit headwaters will occur on a regular basis. Appendix F: Table 6 lists those species of fishes known from streams draining the Galesburg section of the Western Forest-Prairie Division that are likely to be present in the petition area.

The surface mine ponds already present contain introduced populations of sport fish including largemouth bass, bluegill, green sunfish, white crappie, black bullhead, and channel catfish (Ken Russell, IDOC, personal communication). These ponds undoubtedly also contain released bait bucket fishes such as bluntnose minnnows, fathead minnows, and red shiners.

TABLE VII-3

Fishes collected by INHS and IDOC personnel from tributaries of the Spoon and Illinois rivers that drain the Galesburg section of the Western Forest-Prairie Division in Fulton, Knox, and Peoria counties. Site #'s 1 - 17. Complete locality information given in Appendix F.

SPECIES	Site # 1	Site # 2	Site # 3	Site # 4	Site # 5	Site # 6	Site # 7	Site # 8	Site # 9	Site # 10	Site # 11	Site # 12	Site # 13	Site # 14	Site # 15	Site # 16	Site # 17
CLUPEIDAE																	
Dorosoma cepedianum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
Gizzard shad																	
CYPRINIDAE																	
Cyprinus carpio	-	-	-	-	-	-	-	2	-	-	-	-	-	-	30	12	1
Carp																	
Notemigonus crysoleucas	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Golden shiner																	
Semotilus atromaculatus	2	1	-	25	8	1	-	-	-	25	4	1	10	19	-	2	9
Creek chub																	
Campostoma anomalum	6	9	-	39	-	-	-	-	3	66	4	5	10	38	7	2	12
Central stoneroller																	
Nocomis biguttatus	1	6	-	-	1	1	-	1	-	2	-	4	10	-	-	-	-
Hornyhead chub																	
Rhinichthys atratulus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
Blacknose dace																	
Phenacobius mirabilis	1	1	-	-	-	-	-	-	2	-	-	-	7	-	1	4	-
Suckermouth minnow																	
Hybopsis dorsalis	23	1	-	57	5	2	-	11	2	45	7	8	42	190	15	12	1
Bigmouth shiner																	
Cyprinella lutrensis	54	71	75	-	186	193	86	33	20	8	48	4	68	3	12	21	20
Red shiner																	
Luxilus chrysocephalus	87	12	23	-	2	11	-	2	-	-	1	-	-	-	-	1	-
Striped shiner																	
Lythrurus umbratilus	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Redfin shiner																	

TABLE VII-3

(continued).

SPECIES	Site # 1	Site # 2	Site # 3	Site # 4	Site # 5	Site # 6	Site # 7	Site # 8	Site # 9	Site # 10	Site # 11	Site # 12	Site # 13	Site # 14	Site # 15	Site # 16	Site # 17
Notropis atherinoides Emerald shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	-	-
N. ludibundus Sand shiner	23	25	17	-	5	3	9	3	7	12	7	3	33	2	10	17	11
Phoxinus erythrogster Southern redbelly dace	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-
Hybognathus nuchalis Mississippi silvery minnow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pimephales notatus Bluntnose minnow	14	39	26	-	26	51	7	3	11	30	1	7	63	-	3	15	1
P. promelas Fathead minnow	3	-	1	-	-	20	-	6	-	-	-	-	1	-	-	-	-
CATOSTOMIDAE																	
Ictiobus cyprinellus Bigmouth buffalo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Carpiodes carpio River carpsucker	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-
C. cyprinus Quillback	2	1	1	-	-	-	-	-	1	-	2	-	-	1	-	9	1
M. erythrurum Golden redhorse	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
M. macrolepidotum Shorthead redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1

TABLE VII-3

(continued).

SPECIES	Site # 1	Site # 2	Site # 3	Site # 4	Site # 5	Site # 6	Site # 7	Site # 8	Site # 9	Site # 10	Site # 11	Site # 12	Site # 13	Site # 14	Site # 15	Site # 16	Site # 17
Catostomus commersoni White sucker	1	3	-	-	-	-	-	1	1	13	3	-	1	-	2	3	2
Minytrema melanops Spotted sucker	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-
ICTALURIDAE																	
Ameiurus melas Black bullhead	-	1	-	-	-	-	-	1	-	-	1	-	1	-	-	-	-
A. natalis Yellow bullhead	-	-	-	-	-	-	-	-	-	-	-	1	6	-	-	-	1
Ictalurus punctatus Channel catfish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Noturus flavus Stonecat	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
CENTRARCHIDAE																	
Micropterus dolomieui Smallmouth bass	-	1	1	-	3	1	-	1	2	-	-	-	-	-	-	-	-
M. salmoides Largemouth bass	1	1	-	-	-	-	-	-	1	1	1	-	-	-	3	4	-
Lepomis cyanellus Green sunfish	-	7	-	1	-	-	-	6	-	-	1	2	10	1	-	5	-
L. gibbosus Pumkinseed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
L. humilis Orangespotted sunfish	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE VII-3

(concluded).

SPECIES	Site # 1	Site # 2	Site # 3	Site # 4	Site # 5	Site # 6	Site # 7	Site # 8	Site # 9	Site # 10	Site # 11	Site # 12	Site # 13	Site # 14	Site # 15	Site # 16	Site # 17
Lepomis macrochirus Bluegill	-	4	-	-	1	-	-	-	1	-	1	-	-	-	-	1	-
Pomoxis annularis White crappie	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P. nigromaculatus Black crappie	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PERCIDAE																	
Percina caprodes Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P. maculata Blackside darter	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
P. phoxocephala Slenderhead darter	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Etheostoma flabellare Fantail darter	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E. nigrum Johnny darter	3	1	1	1	-	-	-	-	13	10	-	2	1	-	-	27	-
E. spectabile Orangethroat darter	-	-	-	1	-	-	-	-	-	-	-	1	-	1	-	2	-
Total Number of Species	15	20	8	7	9	9	3	14	15	10	14	11	14	8	10	22	13

TABLE VII-4

Fishes collected by INHS and IDOC personnel from tributaries of the Spoon and Illinois rivers that drain the Galesburg section of the Western Forest-Prairie Division in Fulton, Knox, and Peoria counties. Site #'s 18 - 34. Complete locality information given in Appendix F.

SPECIES	Site # 18	Site # 19	Site # 20	Site # 21	Site # 22	Site # 23	Site # 24	Site # 25	Site # 26	Site # 27	Site # 28	Site # 29	Site # 30	Site # 31	Site # 32	Site # 33	Site # 34
CLUPEIDAE																	
Dorosoma cepedianum Gizzard shad	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
CYPRINIDAE																	
Cyprinus carpio Carp	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notemigonus crysoleucas Golden shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Semotilus atromaculatus Creek chub	1	19	-	3	10	-	-	20	1	-	46	-	6	-	1	45	17
Campostoma anomalum Central stoneroller	7	7	-	10	10	-	-	3	27	-	201	11	2	-	1	129	19
Nocomis biguttatus Hornyhead chub	1	1	-	2	-	-	-	-	2	-	-	1	-	-	-	-	13
Rhinichthys atratulus Blacknose dace	-	-	-	16	4	-	-	-	2	1	14	-	-	1	4	18	-
Phenacobius mirabilis Suckermouth minnow	4	-	-	1	-	-	-	-	16	-	-	1	-	-	-	21	6
Hybopsis dorsalis Bigmouth shiner	29	6	-	26	20	3	-	6	4	-	23	1	63	-	1	453	165
Cyprinella lutrensis Red shiner	35	89	-	11	-	-	-	281	47	-	-	76	7	-	-	9	22
Luxilus chrysocephalus Striped shiner	-	-	-	-	-	-	-	-	2	-	-	3	3	-	-	-	8
Lythrurus umbratilus Redfin shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE VII-4

(continued).

SPECIES	Site # 18	Site # 19	Site # 20	Site # 21	Site # 22	Site # 23	Site # 24	Site # 25	Site # 26	Site # 27	Site # 28	Site # 29	Site # 30	Site # 31	Site # 32	Site # 33	Site # 34
Notropis atherinoides Emerald shiner	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-
N. ludibundus Sand shiner	28	15	-	9	-	-	-	16	16	-	-	32	1	-	-	68	42
Phoxinus erythrogster Southern redbelly dace	-	-	1	-	-	-	3	-	-	-	74	-	-	-	3	2	-
Hybognathus nuchalis Mississippi silvery minnow	-	-	-	-	-	-	-	8	-	-	16	-	-	-	-	-	2
Pimephales notatus Bluntnose minnow	9	26	-	1	1	-	-	5	59	-	3	17	6	-	-	123	51
P. promelas Fathead minnow	-	-	-	1	-	-	-	-	-	-	-	-	2	-	-	-	1
CATOSTOMIDAE																	
Ictiobus cyprinellus Bigmouth buffalo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carpiodes carpio River carpsucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C. cyprinus Quillback	1	28	-	-	-	-	-	-	2	-	-	1	2	-	-	3	12
M. erythrurum Golden redhorse	-	5	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
M. macrolepidotum Shorthead redhorse	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE VII-4

. (continued).

SPECIES	Site # 18	Site # 19	Site # 20	Site # 21	Site # 22	Site # 23	Site # 24	Site # 25	Site # 26	Site # 27	Site # 28	Site # 29	Site # 30	Site # 31	Site # 32	Site # 33	Site # 34
Catostomus commersoni White sucker	1	5	-	1	-	-	-	7	3	-	-	2	2	-	-	-	7
Minytrema melanops Spotted sucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ICTALURIDAE																	
Ameiurus melas Black bullhead	1	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
A. natalis Yellow bullhead	2	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	6
Ictalurus punctatus Channel catfish	-	1	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Noturus flavus Stonecat	-	-	-	-	-	-	-	-	9	-	-	2	-	-	-	-	-
CENTRARCHIDAE																	
Micropterus dolomieui Smallmouth bass	1	1	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-
M. salmoides Largemouth bass	4	4	-	-	-	-	-	1	-	-	-	1	-	-	-	-	17
Lepomis cyanellus Green sunfish	-	-	-	-	1	-	-	2	2	-	1	6	1	-	-	1	6
L.. gibbosus Pumpkinseed	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
L. humilis Orangespotted sunfish	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-

TABLE VII-4

(concluded).

SPECIES	Site # 18	Site # 19	Site # 20	Site # 21	Site # 22	Site # 23	Site # 24	Site # 25	Site # 26	Site # 27	Site # 28	Site # 29	Site # 30	Site # 31	Site # 32	Site # 33	Site # 34
Lepomis macrochirus Bluegill	-	-	-	4	-	-	-	-	1	-	-	2	-	-	-	-	7
Pomoxis annularis White crappie	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P. nigromaculatus Black crappie	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PERCIDAE																	
Percina caprodes Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
P. maculata Blackside darter	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P. phoxocephala Slenderhead darter	1	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-
Etheostoma flabellare Fantail darter	-	-	-	-	-	-	-	-	83	-	-	1	-	-	-	-	-
E. nigrum Johnny darter	-	1	-	-	-	-	-	-	4	-	-	-	1	-	-	-	5
E. spectabile Orangethroat darter	-	-	-	-	-	-	-	1	22	-	15	1	3	-	16	43	-
Total Number of Species	17	16	1	12	6	1	1	13	20	1	9	23	13	2	6	12	19

High Value Wildlife Components

Economically Important Species

Mammals -- Several economically important species of game animals and furbearers are known or likely to occur within the petition area. The IDOC annually compiles hunter and trapper harvest data for ten wildlife management units within the state; Knox County is included in the Western Prairie/Forest wildlife management unit. It is difficult to relate harvest figures for the entire management unit to the petition area because of habitat heterogeneity and potential differences in hunting or trapping pressure within the unit. These figures may, however, provide a general idea of species abundance and the economic importance of hunting and trapping to the region. Game mammals (as defined by the Illinois Wildlife Code) that would be found in the area are the eastern cottontail, woodchuck, fox squirrel and white-tailed deer. During the 1988-89 hunting season, the Western Prairie/Forest unit ranked second among all management units in the average season bag of deer (with firearms) and third in the average season bag of fox squirrel and deer (by archery). Some furbearers are also hunted and substantial numbers of raccoon (average season bag 13.23) and opossum (5.11) were harvested in this unit (Andrews and Ellis 1990).

Furbearers likely to occur in the petition area are the opossum, muskrat, coyote, red fox, raccoon, weasels, mink and striped skunk (there is no open season on the badger in Illinois). During the 1987-88 trapping season, the Western Prairie/Forest wildlife management unit ranked fifth or lower among all units in the estimated harvest/100 sq km of opossum (eighth), muskrat (sixth), red fox (fifth), raccoon (sixth), mink (tenth) and striped skunk (eighth). Very few weasels were trapped in Illinois (the total harvest was estimated at 183), but the Western Prairie/Forest unit ranked second

among management units in estimated total harvest and estimated harvest/100 sq km. The unit ranked first for coyote with an estimated harvest of 14.92/100 sq km (Hubert 1988).

Waterfowl and Upland Game Birds -- Thirty-five species of game birds, 27 waterfowl and 8 upland game (as defined by the Illinois Wildlife Code), have been recorded within Fulton, Knox, and Peoria counties during the past 15 years (Table VII-5 and Appendix F: Tables 2 and 3). Past surface mining practices within the petition area have created habitat that can be used by a variety of game species. Surface-mine ponds provide foraging and resting habitat for migrating waterfowl (Lawrence et al. 1985). Waste grains left in post-harvest row-cropped fields attract large numbers of geese during the autumn. Hunting is actively pursued in this area as evidenced by the existence of several nearby "hunt clubs" (Jack Terrell, local resident, personal communication).

The interspersion of grasslands, pastured fields and small woodlots present in the petition area is suitable habitat for upland game birds such as the northern bobwhite, gray partridge, ring-necked pheasant, mourning dove, and American woodcock. Moist sites with persistent emergent vegetation, sedge meadows, or wet depressions are important to the Virginia and Sora rails and common snipe. No evidence of emergent vegetation or wet depressions was visible during our January field reconnaissance; therefore, we can not suggest that these species would be likely to occur within the petition area. If surface-mine ponds ringed with emergent vegetation and other emergent wetlands were present, there would be a greater chance for their occurrence. Partridge, rails, woodcock, and snipe probably would not occur in large numbers anyway.

Hunter harvest data for the 1988-89 hunting season indicates that the Western Prairie/Forest wildlife management unit, which includes Fulton, Knox, and Peoria counties, ranks in the mid to low range among all management units in its total harvest data for waterfowl and upland game birds (Andrews and Ellis 1990). Total estimated harvest data showed that the mourning dove was the most heavily harvested (98,494 birds), followed by bobwhite, ducks (as a whole), and ring-necked pheasant. The species showing the least numbers harvested were partridge, coot, snipe, and woodcock. There were no rails harvested in the 1988-89 season.

TABLE VII-5

ECONOMICALLY IMPORTANT BIRD SPECIES

Species	Breeding Season	Migration Season	Knox County	Adjacent County	Likely to Occur
Greater white-fronted goose	--	X	X	X	Y
Snow goose	--	X	X	X	Y
Canada goose	X	X	X	X	Y
Wood duck	X	X	X	X	Y
Green-winged teal	--	X	X	X	Y
American black duck	X	X	X	X	Y
Mallard	X	X	X	X	Y
Northern pintail	X	X	X	X	Y
Blue-winged teal	X	X	X	X	Y
Cinnamon teal	--	X	--	X	N
Northern shoveler	--	X	X	X	Y
American wigeon	--	X	X	X	Y
Canvasback	--	X	--	X	Y
Redhead	--	X	--	X	Y
Ring-necked duck	--	X	X	X	Y
Lesser scaup	X	X	X	X	Y
Greater scaup	--	X	X	X	Y
Surf scoter	--	X	X	--	Y
Black scoter	--	X	--	X	Y
White-winged scoter	--	X	X	X	Y
Common goldeneye	--	X	--	X	Y
Bufflehead	--	X	--	X	Y
Hooded merganser	X	X	X	X	Y
Common merganser	--	X	X	X	Y
Red-breasted merganser	--	X	X	X	Y
Ruddy duck	--	X	X	X	Y
Gray partridge	--	X	X	--	Y
Ring-necked pheasant	X	X	X	X	Y
Northern bobwhite	X	X	X	--	Y
Virginia rail	X	X	X	X	N
Sora	X	X	X	X	N
American coot	X	X	X	X	Y
Common snipe	X	X	X	X	Y
American woodcock	X	X	X	X	Y
Mourning dove	X	X	X	--	Y

Likely to occur= species has a > 50% chance of being observed using habitat within the petition area during any season.
Recorded from Fulton, Knox, and Peoria counties during the past 15 years.
Data taken from the IFWIS database (INHS)

Sport and Commercial Fisheries -- No commercial fishery exists in the streams or ponds in the vicinity of the petition area. The surface mine ponds already present contain introduced populations of sport fish including largemouth bass, bluegill, green sunfish, white crappie, black bullhead, and channel catfish (Ken Russell, IDOC, personal communication). These ponds undoubtedly also contain released bait bucket minnows such as bluntnose minnnows, fathead minnows, and red shiners. Sport fishes most likely to occur in the headwaters draining the petition area include yellow bullhead, largemouth bass, bluegill, and green sunfish.

Nongame Fishes -- In addition to those fish species that are of direct economic and/or sport importance, all indigenous nongame fish (i.e., minnows, darters, etc.) serve as crucial functional components in the aquatic ecosystem, including elements of the food webs that sustain other (sometimes) more visible and highly valued organisms such as mammals, birds, and sport fish. As such, they represent an essential functional component in most ecosystems, and are considered high value wildlife.

Endangered and Threatened Species

This section includes comments and data concerning those species in each taxa that have been recorded in Fulton, Knox and Peoria counties, or thought likely to occur within the petition area, and are designated as endangered and threatened species on either the Federal level (Endangered Species Act of 1973, 16th U. S. Congress, docket 1531) or on the state level (Illinois Administrative Code, Title 17, Chapter I, subchapter c, part 1010.30, as amended March 17, 1989). Therefore, any species which is in danger of extinction throughout all or a significant portion of its range is considered to be endangered at the Federal level and will be referred to as "Federally

endangered." Any species which is in danger of extinction as a breeding species in Illinois is considered to be endangered at the state level and will be referred to as "state endangered." Finally, any species which is likely to become a state endangered species within the foreseeable future in Illinois is considered to be a threatened species at the state level and will be referred to "state threatened." The above definitions are taken from the Checklist of Endangered and Threatened Animals and Plants of Illinois, Illinois Endangered Species Protection Board, March 1989.

Mammals -- Only two Federally endangered mammals occur in Illinois: the Indiana bat, *Myotis sodalis*, and the gray myotis (bat), *M. grisescens* (50 CFR 17, subpart B, subsection 17.11). The few localities from which the gray bat is known in Illinois are in the southern and west-central portions of the state. This species uses caves throughout the year and would not be found in the petition area since no roosting sites are available. There are more records for the Indiana bat and this species has a wider distribution in Illinois, although most of the records are from southern and west-central Illinois (Thom 1981; INHD). Indiana bats have been captured in McDonough and Schuyler counties and Blackball Mine in LaSalle County has been a major hibernaculum for the Indiana bat, but no records exist for Knox, Fulton and Peoria counties (Thom 1981; INHD). This species roosts under the loose bark of trees during the summer. Little of the petition area is wooded; the narrow wooded riparian corridors contain few mature trees that would provide suitable roosting sites.

In addition to the gray and Indiana bats, eight mammals are listed as state endangered or threatened in Illinois (Illinois Administrative Code, Title 17, Chapter I, subchapter c, part 1010.30, 1989). Of these, the southeastern bat (*M. austroriparius*), Rafinesque's big-eared bat (*Plecotus rafinesquii*), eastern wood rat

(*Neotoma floridana*), white-tailed jackrabbit (*Lepus townsendii*), golden mouse (*Ochrotomys nuttalli*) and rice rat (*Oryzomys palustris*) have limited distributions within the state which do not include Knox, Fulton and Peoria counties (Thom 1981; INHD). The state endangered river otter (*Lutra canadensis*) has been reported from 38 counties since 1980, but the main population of this species occurs along the Mississippi River north of Rock Island (Anderson 1982; INHD). Signs of a river otter were observed near London Mills in Knox County in 1980 (Anderson 1982) and an otter was sighted at Banner Marsh Wildlife Area in Peoria County during 1987 (INHD). Areas used by river otters along the Mississippi River have extensive riparian woodlands, good water quality, open water during winter and suitable den sites (e.g. log piles) and are relatively inaccessible to humans (Anderson and Woolf 1984). No suitable habitat for river otters occurs within the petition area.

The state threatened bobcat (*Lynx rufus*) has been reported from 51 counties since 1980, although most of these reports are not confirmed (Rhea 1982). Trappers interviewed by a mail survey reported sightings in Fulton, Knox and Peoria counties during 1980-81 (Rhea 1982). No more recent sightings in these three counties are listed in the Illinois Natural Heritage Database. Ideal habitat for bobcats would be rough terrain where second-growth forest with dense underbrush was interspersed with clearings, glades, rocky outcrops or swamps. Rhea (1982) considered large areas (greater than 100 sq mi) with more than 50 percent forest cover important for self-sustaining populations. Most of the petition area is agricultural land; there is not enough forest cover with suitable den sites (e.g. small caves, rock crevices, rockpiles, hollow logs, brushpiles) to support a breeding population of bobcats.

Birds -- Four Federally endangered, 24 state endangered and six state threatened bird species have been recorded within Fulton, Knox, and Peoria counties during the past

15 years (Table VII-6); only eight appear likely to occur in the petition area. Most of the species were recorded from areas near the Illinois River and would not be found in the habitats present within the petition area.

The species most likely to occur within the petition area are those that use grassland/pasture and open habitat types, such as the state endangered northern harrier, upland sandpiper, and short-eared owl, and the state threatened loggerhead shrike, Henslow's sparrow, and Brewer's blackbird (Table VII-6). The Federally endangered peregrine falcon is known to forage in open habitats and is more widely distributed during migration seasons. This species recently has been recorded during both the breeding and migration seasons in Fulton and Peoria counties, and during the spring in Knox County (Appendix F: Table 2).

The pied-billed grebe, a state endangered species, can use surface-mine ponds as both foraging and stop-over habitat. Recently, nests have been found in surface-mine ponds in southern Illinois (Todd Fink, IDOC, personal communication). Suitable breeding habitat can occur if dense persistent emergent vegetation and open water are present simultaneously.

TABLE VII-6

ENDANGERED AND THREATENED BIRD SPECIES

Species	Status	Breeding Season	Migration Season	Knox County	Adjacent County	Likely to Occur
Pied-billed grebe	E	X	X	--	X	Y
Double-crested cormorant	E	X	X	X	X	N
American bittern	E	X	X	X	X	N
Least bittern	E	X	X	X	X	N
Great egret	E	X	X	X	X	N
Snowy egret	E	X	X	--	X	N
Little blue heron	E	X	X	--	X	N
Black-crowned night-heron	E	X	X	X	X	N
Osprey	E	X	X	X	X	N
Bald eagle	E*	--	X	X	X	N
Northern harrier	E	X	X	X	X	Y
Sharp-shinned hawk	E	--	X	X	X	N
Cooper's hawk	E	X	X	X	--	N
Red-shouldered hawk	E	--	X	--	X	N
Peregrine falcon	E*	X	X	X	X	Y
Black rail	E	X	--	--	X	N
Common moorhen	T	--	X	X	X	N
Sandhill crane	E	--	X	X	X	N
Piping plover	E*	--	X	X	X	N
Upland sandpiper	E	X	X	X	X	Y
Wilson's plover	E	--	X	--	X	N
Common tern	E	--	X	--	X	N
Forster's tern	E	--	X	X	X	N
Least tern	E*	--	X	--	X	N
Black tern	E	--	X	X	X	N
Long-eared owl	E	--	X	--	X	N
Short-eared owl	E	X	X	X	X	Y
Brown creeper	T	X	X	X	X	N
Bewick's wren	E	--	X	X	--	N
Veery	T	X	X	X	X	N
Loggerhead shrike	T	X	X	X	X	Y
Clay-colored sparrow	E	--	X	--	X	N
Henslow's sparrow	T	X	X	X	X	Y
Brewer's blackbird	T	--	X	X	X	Y

E = state endangered species; T = state threatened species; * = Federal endangered species

Likely to occur = species has a > 50% chance of being observed using habitat within the petition area during any season.

Recorded from Fulton, Knox and Peoria counties during the past 15 years.

Data taken from IFWIS database (INHS)

Reptiles and Amphibians -- No Federally endangered or threatened reptiles or amphibians occur in Illinois. Seven species (two amphibians and five reptiles) are listed as state endangered and five (one amphibian and four reptiles) as state threatened (Illinois Administrative Code, Title 17, Chapter I, subchapter c, part 1010.30, 1989). Six of the state endangered species, the dusky salamander (*Desmognathus fuscus*), silvery salamander (*Ambystoma platineum*), spotted turtle (*Clemmys guttata*), slider (*Pseudemys concinna*), broad-banded watersnake (*Nerodia fasciata*) and eastern ribbon snake (*Thamnophis sauritus*), have very limited ranges which do not include the petition area and the four reptiles may, in fact, be extirpated from the state (Morris and Smith 1981). The petition area lies within the range of the Illinois mud turtle (*Kinosternon flavescens*), but there are no records of this species from Fulton, Knox or Peoria counties (Morris and Smith 1981; INHD). The Illinois mud turtle inhabits relatively undisturbed sand areas with permanent or semi-permanent ponds (Smith 1961); no such habitat exists within the petition area.

The ranges of four state threatened species, the Illinois chorus frog (*Pseudacris streckeri*), coachwhip snake (*Masticophis flagellum*), great plains rat snake (*Elaphe guttata*) and green watersnake (*Nerodia cyclopion*), do not include the petition area (Morris and Smith 1981; INHD). The western hognose snake (*Heterodon nasicus*) occurs in northwestern and western Illinois, but there are no records for Fulton, Knox or Peoria counties (Morris and Smith 1981; INHD). Typical habitat for the western hognose snake in Illinois is sand prairie and it is now restricted to relict sand areas within its original range (Smith 1961). No suitable habitat for this species occurs within the petition area.

Fishes -- No fishes listed as endangered or threatened at the Federal or state level are known to occur in tributaries of the Spoon and Illinois rivers that drain the Galesburg section of the Western Forest-Prairie Division in Fulton, Knox or Peoria counties.

CHAPTER VIII.

CULTURAL RESOURCES

A. INTRODUCTION

Heretofore, Salem Township has not been the subject of a systematic cultural resource study. The Illinois Archaeological Survey site files include only one prehistoric and one historical American Indian site in the area. Historical accounts have no record of European Colonial archaeological or architectural sites. Museum archaeologists conducted an assessment of historical American archaeological and architectural sites in Salem Township as part of this study. They relied on county histories, plat maps, and atlases, and a limited 'windshield' survey to compile information for this assessment.

To evaluate the cultural resource potential of Salem Township, Museum archaeologists studied the entire roster of 154 Knox County archaeological sites. Using this information, they estimated site distribution and antiquity for Salem Township. The results of these analyses follow.

B. CULTURAL RESOURCES

Prehistoric American Indian Archaeological Sites

Sites are documented in Table VIII-1 and Maps 62-63.

Berkson et al. in 1976 conducted the only archaeological reconnaissance project recorded for Salem Township. While examining the location of a temporary bridge over the West Fork of Kickapoo Creek, they discovered a prehistoric American Indian site (11Kx156). However, they found no culturally diagnostic artifacts.

TABLE VIII-1

SUMMARY OF PREHISTORIC AMERICAN INDIAN ARCHAEOLOGICAL SITES IN SALEM TOWNSHIP

Site Number	Quarter Section	Cultural Affiliation	Site Extent	Drainage	Physical Setting
Kx-156		Unknown	1628m2	W.Fork Kickapoo	Floodplain
Kx-160	34	Unknown			Upland?

Source: Data from Illinois Archaeological Survey site file.

Broyles (IAS site file) recorded, but did not visit, a presumed prehistoric mound (11Kx160) in Salem Township Section 34. The property owner, Kenneth McDonald, found projectile points and beads at the site. The antiquity of these artifacts is unknown. The area has since been mined.

Analysis of Knox County Sites

Table VIII-2 summarizes the cultural affiliation and topographic location of all recorded archaeological sites in Knox County. Although not the product of a systematic study, these data provide tentative expectations for the antiquity and distribution of cultural resources in Salem Township. Inspection of these data results in the following observations:

1) Upland settings (bluffcrest and upland settings) account for the highest proportion (74/154=48%) of sites. The rest are evenly divided between floodplain and bluffbase/bluffslope landforms.

2) Upland topography characterizes most of Salem Township. It is bordered on the west and east by small tributary streams. Archaic sites account for 65 percent (15/23=65%) of sites of known cultural affiliation in upland settings. The affiliation of 51 (51/74=69%) upland sites is unknown. Historic American Indian and American sites, the second most common types, account for 26% (22/66=22%) of the sites of known cultural affiliation.

3) Other studies show that the highest frequency of upland sites are within 200 m of water sources, tributary streams or ponds (McGimsey et al. 1989).

Based on these observations, Salem Township likely contains primarily Archaic sites situated near tributary streams. Nothing precludes the presence of sites representing other periods. However, based on previous studies their density will be less than that of Archaic sites. Confirmation of these expectations requires systematic field work.

TABLE VIII-2

CROSSTABULATION OF CULTURAL AFFILIATION BY LANDFORM OF KNOX COUNTY ARCHAEOLOGICAL SITES

Cultural Affiliation	Landform Type FP	TR	BB	BS	BC	UP	UN[1]	Total
Historic-American	-	1	1	-	1	2	-	5
Historic-American Indian	4	-	3	-	1	2	7	17
Mississippian	-	-	-	-	-	-	-	0
Late Woodland	-	-	3	-	1	-	-	4
Middle Woodland	2	-	-	-	-	-	1	3
Early Woodland	-	-	1	-	-	-	-	1
Woodland	2	-	2	-	1	-	-	5
Late Archaic	1	-	-	-	-	-	-	1
Middle Archaic	-	-	-	-	-	-	-	0
Early Archaic	1	-	-	-	-	1	-	2
Archaic	3	1	-	-	9	2	3	18
Paleo-Indian	-	-	-	1	-	-	-	1
Multicomponent	-	1	-	-	-	1	-	2
Archaic-Woodland-Historic American	-	1	-	-	-	-	-	1
Archaic-Woodland-Mississippian	1	-	-	-	-	-	-	1
Archaic-Woodland	-	2	-	1	2	-	-	5
Unknown	18	-	16	3	34	17	0	88
Total	32	6	26	5	49	25	11	154

Source: Data compiled from the Illinois Geolographic Information System and the Illinois Archaeological Survey.

[1]Key for Landform Type: FP - floodplain, TR - terrace, BB - bluffbase, BS - bluffslope BC - bluffcrest, UP - upland, UN - unknown

Colonial European Sites

There is no record of colonial European sites in Salem Township.

Historical American Indians and Europeans

Maple (1912:45) refers to a Potawatomi village (11Kx103) in Section 25 of Salem Township near Kickapoo Creek (Table VIII-3). However, no one documented the site before mine activity destroyed the most likely location.

According to Chapman (1878:502), Sala Blakeslee built the first frame building in Salem Township in 1837. Fire destroyed this structure in the same year. As noted earlier, Perry (1912:443) refers to a log school house in Section 29. Later on the same page, he notes that Michael Egan's home stood nearby. The precise locations of Alexander Taylor's home (Section 6), William Kent's home (Section 13), or either of the two sawmills (Section 13 and Section 14) are not documented.

Also noteworthy is James McKeighan's, and later R. J. McKeighan's, home built in the early 1850s in Section 22. The McKeighan home is now the residence of John and Sharon Terrell.

Neither Chapman (1878) nor Perry (1912) provide information on other Salem Township structures or archaeological sites.

TABLE VIII-3

SUMMARY ON HISTORICAL AMERICAN INDIAN ARCHAEOLOGICAL SITES IN SALEM TOWNSHIP

Site Number	Section	Quarter Section	Cultural Affiliation	Site Extent	Drainage	Physical Setting
Kx-103	25		Potawatomi	Unknown		

Source: Data from Illinois Archaeological Survey site file.

Historical American Archaeological and Architectural Sites

Before the Museum's Lands Unsuitable petition assessment, previous studies noted the architecture of only three Salem Township buildings. In 1973, the Illinois Department of Conservation, Historic Sites Division (now the Illinois Historic Preservation Agency) inventoried historic landmarks in Knox County, including outstanding examples of architectural style (Illinois Department of Conservation 1973). They documented two structures in Salem Township, one of which is in the petition area. The Cooper House (Kx-H-23), built ca. 1875, is a very large Italianate farmhouse in Section 15. Mrs. Sharon Terrell brought attention to the history of her home, originally built in 1849 by James McKeighan (Chapman 1886). An analysis of documentary sources and limited field work supplements this information.

Plat maps and historical atlases provide information on the location, distribution and the antiquity of potential archaeological and extant architectural sites. Museum staff digitized separate coverages of published plat maps, including the 1861 (W.H. Thompson), 1870 (Andreas Lyter & Co.), and 1903 (George Ogle) editions (see

Maps 64-66). Analysis consisted of assigning each structure a unique record number, recording its legal description, and its presence/absence on later plat maps. Examination of topographic sheets published in 1972 and 1984, further reduced the list of extant structures. This analysis provided a list of potential historical archaeological sites with no longer extant structures (Table VIII-4) and a list of extant architectural structures in the petition area (Table VIII-5).

Archaeological Sites

Plat map analysis resulted in the identification of 38 potential historical American archaeological sites (Map 67). The proportion of mid-19th century sites is noteworthy -- 23 (23/38=64%) appear on the 1861 plat map. However, nine (10/23=43%) also appear on the 1903 plat. Occupation of these structures spanned at least 50 years.

All of these buildings were residences except site 14, which was a school. We found no record of the architectural style of these structures. Nor did we conduct a chain of title search or examine census records to determine the historical significance of any of the residents.

Extant Structures

There are 24 extant residential structures in the petition area (Map 68). Several of these are abandoned and dilapidated. Fifteen (62%) of these buildings appear on the 1861 plat map. It is not clear, however, if the original structures still stand.

TABLE VIII-4

SUMMARY ON POTENTIAL HISTORICAL ARCHAEOLOGICAL SITES
IN SALEM TOWNSHIP

Site Number	Section	Quarter Section	1861 Plat	1870 Plat	1903 Plat	1974 1982 Topo	Comments
02	13	NWNWNE	yes	no			
04	13	NWNWNW	yes	no	yes	yes	no at field check
43	13	SESENW	no	yes	yes	no	
44	13	SWNESW	no	yes	no		
54	13	SESWSE	no	no	yes	no	
58	13	SWSWSE	no	yes	no		
07	14	NESENW	yes	yes	yes	no	
09	15	SESENW	yes	yes	yes	no	
10	15	SWSWNE	yes	yes	no		
12	15	SESESW	yes	yes	yes	no	
13	16	SESENE	yes	yes	no		
14	16	NENESW	yes	yes	no		school
17	16	SWSESE	yes	yes	yes	no	
59	16	SWNENE	no	yes	no		
15	21	NWNWNW	yes	yes	no		
18	21	NENENE	yes	no			
19	22	NENWNW	yes	yes	yes	no	
20	22	NWNWNE	yes	yes	no		
23	22	SWSWSE	yes	yes	no		
40	22	NESWNE	yes	yes	no		
41	22	NWSWNE	no	yes	yes	no	
46	22	SENESW	no	no	yes	no	
49	22	NENESW	no	no	yes	no	
24	23	NWNWNE	yes	no			
25	23	NENESE	yes	yes	yes	no	
38	23	NESENE	no	yes	yes	yes	no at field check
39	23	NESENE	no	yes	yes	yes	no at field check
50	23	NWNWSE	no	no	yes	no	
53	23	NWNWNW	no	no	yes	no	
55	23	SESWSW	no	yes	no		
60	28	SESENE	yes	yes	no		
61	28	SESWSW	yes	yes	no		
62	28	SESWNW	no	no	yes	no	
47	34	NWSWSE	no	no	yes	no	
32	34	SENENW	yes	yes	yes	no	
34	34	SWNWSE	yes	yes	yes	yes	no at field check
36	34	NENESW	no	yes	yes	no	
35	35	SWSWNW	yes	yes	yes	no	

Source: U.S.G.S. topographic sheets, plat maps and field inspection.

TABLE VIII-5

SUMMARY ON EXTANT RESIDENCES IN SALEM TOWNSHIP

Site Number	Section	Quarter Section	1861 Plat	1870 Plat	1903 Plat	1974 1982 Topo	Comments
03	13	NESWNE	yes	yes	no	yes	
05	13	NWNWSW	yes	yes	yes	yes	
42	13	NESENE	no	yes	yes	yes	
57	13	SESWSW	no	no	no	yes	
06	14	SENESE	yes	yes	yes	yes	
56	14	SWSESW	no	no	no	yes	
45	14	SENENE	no	yes	yes	yes	
48	14	SESWSW	no	yes	yes	yes	
08	15	SENENW	yes	yes	yes	yes	
11	15	SESWSE	yes	yes	yes	yes	Cooper House
16	16	SWSWSE	yes	yes	yes	yes	
21	22	SWNWSE	yes	yes	yes	yes	
22	22	NESESW	yes	yes	yes	yes	
51	22	NWNWSE	no	no	no	yes	
26	27	SESENW	yes	yes	yes	yes	
27	27	SWSWNE	yes	yes	yes	yes	
28	27	NWNWSE	yes	yes	yes	yes	
29	27	SENESW	yes	yes	yes	yes	
30	27	NWSWSE	yes	yes	yes	yes	
37	27	NENESW	no	yes	yes	yes	school
52	27	NWSENE	no	no	no	yes	
63	28	SESWNE	no	no	no	yes	
31	34	NWNWNE	yes	yes	yes	yes	
33	34	SENENW	yes	yes	yes	yes	

Source: U.S.G.S. topographic sheets, plat maps and field inspection.

The structure recorded by the Illinois Department of Conservation as the Cooper house still stands. Its Italianate style is largely unmodified. A detailed architectural assessment is necessary to determine if it is eligible for nomination to the National Register of Historic Places.

In Part J: Summary (p. 34 of the petition and 38 in Appendix A) the petitioners describe the Terrell home as "eligible and pending for inclusion upon the National

Register of Historic Places, United States Department of the Interior." Further, "When the Illinois Register of Historic Places opens again for nominations, undoubtedly the McKeighan farmstead and smithy will qualify for eligibility on its listing." To date, the Terrell's have not submitted pertinent documents to the Illinois Historic Preservation Agency or the Advisory Council. The history and archaeological potential of the Terrell property <u>may</u> qualify it for nomination to a national or state list of historic places. However, its eligibility on architectural merit may be compromised by extensive exterior and interior modifications. A determination of eligibility requires:

1) additional investigation by an architectural historian; and,

2) review by the Illinois Historic Preservation Agency and Historic Sites Advisory Council.

This statement also applies to all standing structures in the petition area.

Cemetery

There is one cemetery in the petition area -- the Yates City Cemetery on the south edge of the town (Map 69). Mid-19th-century grave markers are common in the northeast section of this still active cemetery.

CHAPTER IX

SOCIOECONOMIC RESOURCES

A. DEMOGRAPHIC COMPONENTS

Demographic features for the Salem Township, Knox County petition area are evaluated from a regional tri-county perspective. A hierarchical approach was used when possible, beginning with a general tri-county description which includes the counties of Fulton, Knox and Peoria. This 2,211 square mile regional boundary was selected for two reasons. First, the petition locale is centrally located within the tri-county boundary, abutting Fulton and Peoria counties. Secondly, the tri-counties are incorporated in the majority of a 30 mile radius surrounding the centroid of the petition area; 30 miles is a reasonable measure of the distance individuals will commute to their place of employment, or to acquire the commodities and services they deem necessary. A more detailed description focuses on a nine township unit (Map 70) comprised of Salem Township and the surrounding eight townships of Farmington, Fairview (Fulton), Maquon, Haw Creek, Elba (Knox), Brimfield, Elmwood, and Trivoli (Peoria).

In compiling demographic data it is typical to find that sources are not always comparable. This is the result of 1) nonequivalent units of analysis, for example, county versus township level, 2) the use of different benchmark years for baseline statistics, or 3) the use of variable time sequences, i.e. odd or even year intervals; five or ten year intervals. Generally the time interval has an inverse relationship to the level of analysis. As the level of analysis decreases in scale, the time interval for processing data, increases. The following evaluation calls on several sources as a means of portraying to the reader a sense of the demographic trends as they pertain to the area. This section will include demographic descriptions on population, age and sex, general income information, and a breakdown of the population by occupation.

Population Characteristics

The 1980 aggregate population in the tri-county region of Fulton, Knox and Peoria counties is 305,760 which comprises 2.7 percent of the total population of Illinois. Based on population estimates for 1990, total population within the tri-county area will decrease to 272,340, an 11 percent decline over ten years. The ratio between the tri-county population and the population of Illinois, however, remains relatively constant according to these estimates. Table IX-1 illustrates the general population estimates and projections from the year 1980 to 2020 (1970 and 1980 figures are baseline census statistics).

TABLE IX-1

POPULATION PROJECTIONS

County	1970*	1980*	1990	2000	2010	2020
Fulton	41883	43687	36519	32102	29584	28893
Knox	61309	61607	55198	51239	49078	49273
Peoria	195730	200466	180623	170410	169789	177653
Totals	298922	305760	272340	253751	248451	255819

Source: Illinois Bureau of the Budget. 1987.
* Donnelley Marketing Information Services. 1988.

Although this area is considered relatively rural as much as 41 percent of the residents within the three counties resided in the city of Peoria in 1980. Of the three counties, Knox County showed a minor decrease in its urban population between 1970 and 1980, while Fulton and Peoria counties display gradual urban growth. The largest rate of change over the decade, occurred in Fulton County's rural population. Table IX-2 provides a general demographic breakdown for the tri-counties.

TABLE IX-2

POPULATION OF COUNTIES BY URBAN AND RURAL RESIDENCE

County	Total Pop 1970	Total Pop 1980	Urban 1970	Urban 1980	%Change	Rural 1970	Rural 1980	%Change
Fulton	41890	43687	19882	20502	3.1	22008	23185	5.3
Knox	61280	61607	43156	42947	-0.5	18124	18660	3.0
Peoria	195318	200466	163959	168914	3.0	31359	31552	0.6
Total	298488	305760	246879	232363		71491	73397	

Source: U.S.Bureau of the Census. 1980.

The three largest cities in the tri-county region are Canton, Galesburg and Peoria. Canton is located in Fulton County and has a population of 14,626. Galesburg, located in Knox County has a population of 35,305. The city of Peoria contains 124,160 residents (U.S. Bureau of the Census 1980). Several smaller towns and cities are found within the nine township unit encompassing the petition area (See Map 3) Table IX-3 displays the population trends for the aforementioned cities.

TABLE IX-3

CITY POPULATION TRENDS

County	City	1960	1970	1980	1988est.*	1993projection*
Fulton	Canton	13588	14217	14626	12200	9300
	Fairview	544	601	594	500	500
	Farmington	2831	2959	3118	2700	2500
Knox	Galesburg	37243	36290	35305	31200	29700
	Maquon	386	374	350	300	300
	Yates City	802	840	860	700	700
Peoria	Brimfield	654	729	890	800	700
	Elmwood	1882	2014	2117	1900	1700
	Peoria	103162	126963	124160	106100	100900

Source: U.S. Bureau of the Census. 1980.
Donnelley Marketing Information Services. 1988.
* Data derived from the Donnelly Files, 1988 estimates, 1993 projections. Numbers are rounded to the nearest 100.

A perspective of the nine township unit reveals a pattern similar to that of the region as a whole. There is an increase in population between 1970 and 1980 for four of the five townships; Farmington, Brimfield, Elmwood, and Trivoli, with a subsequent decline in residency for the entire township unit based upon 1988 estimates and 1993 projections. Salem Township shows a marginal decrease in population during the 1970's with a dramatic dip occurring between 1980 and 1988. (Table IX-4). Map 71 is a three-dimensional population perspective of the nine township unit.

TABLE IX-4

POPULATION TREND FOR THE NINE TOWNSHIP UNIT

Cty	Twp.	1970	1980	%Chg	1988est.	%Chg	1993proj.	%Chg
Fulton	Fairview	923	864	-6.4	728	-15.7	686	-5.7
	Farmington	3997	4184	4.5	3637	-13.1	3404	-6.4
Knox	Elba	409	373	-8.8	359	-3.8	343	-4.5
	Haw Creek	666	608	-8.7	589	-3.1	565	-4.1
	Maquon	780	705	-9.6	698	1.0	668	-4.3
	Salem	1277	1268	-.7	1019	-19.6	971	-4.7
Peoria	Brimfield	1015	1492	32.0	1292	-13.4	1210	-6.4
	Elmwood	2710	2739	1.1	2395	-12.6	2245	-6.3
	Trivoli	1158	1170	1.0	1023	-12.6	959	-6.3
	Total	12526	13030		11381		1070	

Source: Donnelley Marketing Information Services. 1988.

Age and Sex Composition

The age and sex composition for the tri-county region displays a consistent pattern from 1970 through the 1993 projection. The combined male and female population under the age of 18 represent approximately 1/4th to 1/3rd of the aggregate population for the three counties. The age group 18-34 comprise roughly 1/4th of the population. Representing about 1/3rd of the population are people between the ages of 35-64, with the over 65 group containing between 10 and 17 percent of the population for the three counties. The general trend for this period shows a gradual decline in the under 18 age group, and a continual increase in the over 65 population. These patterns are exemplified in Table IX-5 which depicts this trend for each county. The nine township unit parallels the tri-county trend, however, a glimpse of Salem Township's age and sex breakdown reveals a more pronounced decrease in the

under 18 population between 1980 and 1988est., and a conspicuous increase in the over 65 population for that interval (Table IX-6 and Figure IX-1).

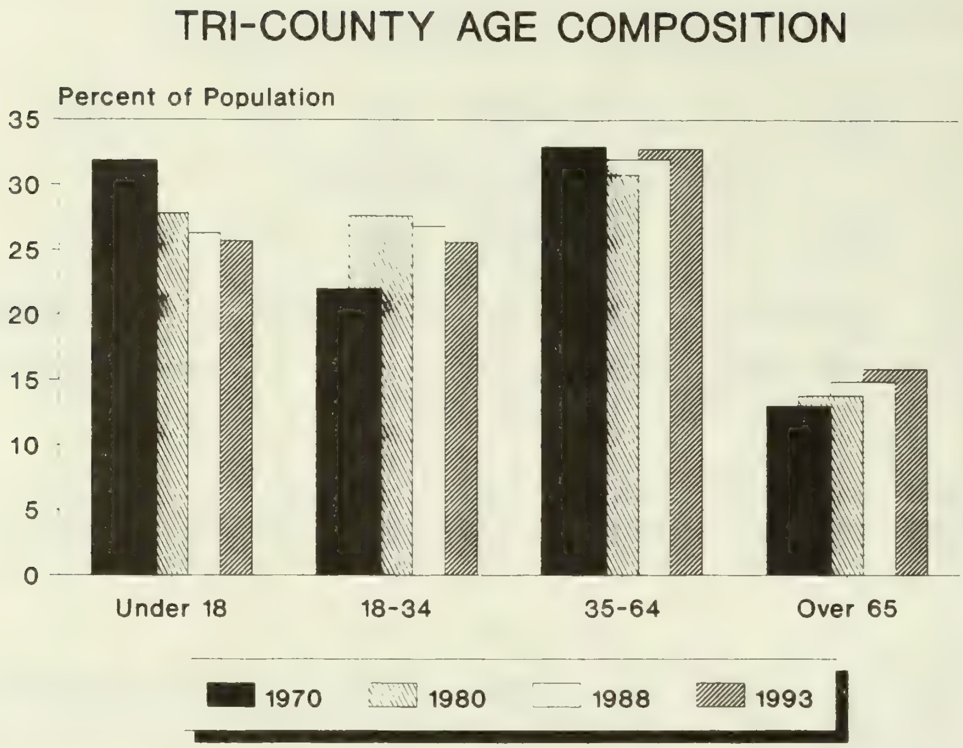
TABLE IX-5

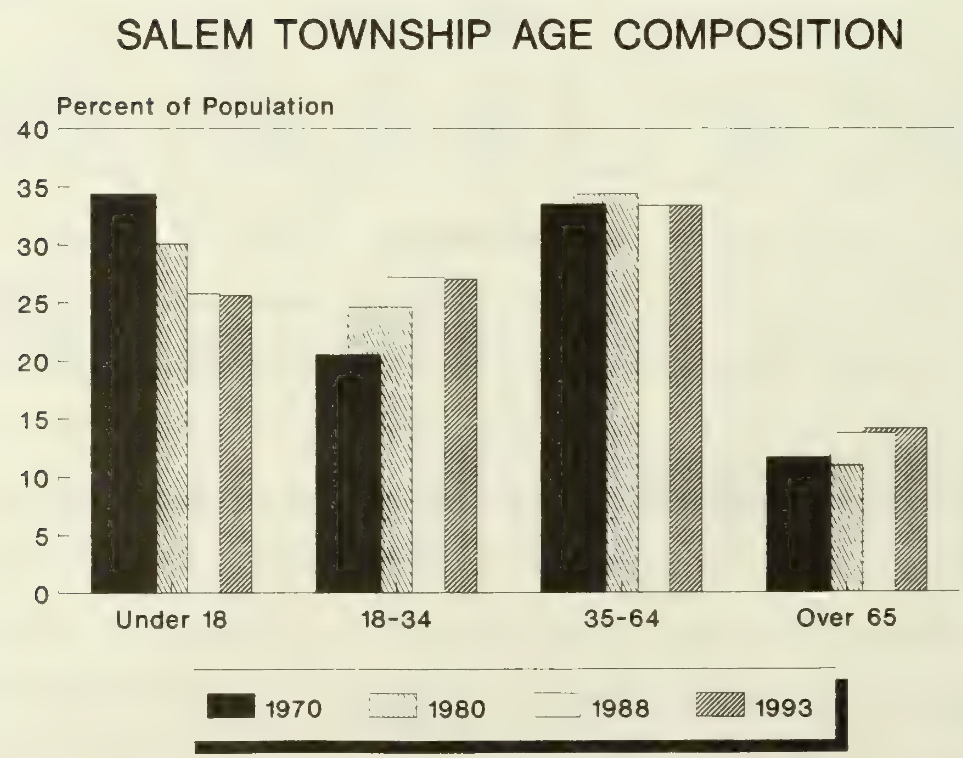
COUNTY AGE AND SEX COMPOSITION

County	Under 18 M%	Under 18 F%	Under 18 Tot%	18-34 M%	18-34 F%	18-34 Tot%	35-64 M%	35-64 F%	35-64 Tot%	Over 65 M%	Over 65 F%	Over 65 Tot%
1970												
Fulton	16.2	15.2	31.4	9.9	10.5	20.4	16.6	17.3	33.9	6.1	8.2	14.3
Knox	15.8	15.2	31.0	10.7	11.4	22.1	15.9	17.0	32.9	5.6	8.4	14.0
Peoria	17.0	16.5	33.5	11.3	12.3	23.6	15.5	16.7	32.2	4.3	6.4	10.7
1980												
Fulton	14.8	13.5	28.3	12.4	12.6	25.0	15.1	16.4	31.5	6.5	8.9	15.3
Knox	13.6	13.2	26.8	13.8	13.8	27.6	15.0	16.2	31.2	5.7	8.7	14.4
Peoria	14.5	13.9	28.4	14.8	15.5	30.3	14.3	15.3	29.6	4.6	7.2	11.8
1988est.												
Fulton	13.7	12.8	26.5	13.0	12.7	25.7	15.3	16.3	31.6	6.6	9.6	16.2
Knox	13.1	12.5	25.6	13.5	13.3	26.8	15.7	16.6	32.2	6.0	9.4	15.4
Peoria	13.8	13.1	26.9	13.8	14.1	27.9	15.6	16.5	32.1	5.1	8.0	13.1
1993projection												
Fulton	13.4	12.7	26.1	12.8	12.1	24.9	15.6	16.6	32.2	6.6	10.1	16.7
Knox	12.6	12.1	24.7	13.4	12.6	26.0	15.9	16.9	32.8	6.4	10.2	16.6
Peoria	13.5	12.8	26.3	13.0	12.8	25.8	16.2	17.3	33.5	5.4	9.0	14.4

Source: Donnelley Marketing Information Services. 1988.
The original data were derived from the Donnelley files, and converted to percentages.

FIGURE IX-1





Source: Donnelly Marketing Information Services. 1988.

TABLE IX-6

SALEM TOWNSHIP AGE AND SEX COMPOSITION

Year	Under 18			18-34			35-64			Over 65		
	M%	F%	Tot%	M%	F%	Tot%	M%	F%	Tot%	M%	F%	Tot%
1970	19.0	15.4	34.4	9.5	11.0	20.5	16.8	16.7	33.5	4.3	7.3	11.6
1980	15.8	14.3	30.1	13.1	11.5	24.6	16.7	17.7	34.4	4.3	6.6	10.9
1988est.	13.0	12.8	25.8	15.2	12.0	27.2	15.9	17.5	33.4	5.8	7.9	13.7
1993pro.	13.0	12.6	25.6	14.6	12.4	27.0	16.2	17.2	33.4	6.4	7.7	14.1

Source: Donnelley Marketing Information Services. 1988.
Original data were derived from the Donnelley files and converted to percentages.

Income

There are several indicators used in profiling the economy of a particular region. Indicators include household income, per capita income, and total personal income. Household income is the collective total money income of all household members during the calender year. The per capita income (PCI) figure is the estimated average amount per person of total money income received during the calender year for all persons residing in a given political jurisdiction. Total personal income is income received from all sources and is a much broader measure.

In 1987, Fulton County had a total personal income of $469,269,000 dollars. This figure ranked 42nd in the state and accounted for .2 percent of the state total. In 1977 Fulton County's total personal income ranked 31st in the state. Knox County had a total personal income in 1987 of $754,469,000. This figure ranked 24th in the state, and accounted for .4 percent of the state total. In 1977, Knox County's total personal income ranked 23rd. In 1987, Peoria County had a total personal income of $2,766,500,000. This figure ranked 11th in the state, and accounted for 1.5 percent of

the state total. In 1977 Peoria County's total personal income ranked 9th in the state (Illinois Department of Commerce and Community Affairs).

An outline of the economy for the tri-county region using household income, shows that the number of households within the lowest income bracket (<$7,499) has and is expected to decline at a gradual rate. Concomitantly, the number of households in the highest income bracket tends to increase at a slow but steady rate. Fulton County exhibits the smallest rate of decrease within the lowest income bracket followed by Knox and Peoria counties. Again, Fulton County shows the slowest rate of change in the higher income bracket followed by Knox and Peoria counties (Table IX-7). Per capita income figures reveal that Fulton County has the lowest per capita income within the tri-county region, ($6,852-1979, $8,333-1985) followed by Knox ($7,340-1979, $9,922-1985) and Peoria ($8,343-1979, $10,888-1985) counties (U.S. Bureau of the Census 1986).

TABLE IX-7

TRI-COUNTY HOUSEHOLD INCOME

Fulton County

Income	1979 #HH	1979 %HH	1988Est. #HH	1988Est. %HH	1993Proj. #HH	1993Proj. %HH
<7499	3659	22.6	2796	19.5	2469	18.1
7500 - 9999	1244	7.7	914	6.4	809	5.9
10000 - 14999	2481	15.3	1899	13.2	1655	12.1
15000 - 24999	4873	30.0	3711	25.9	3293	24.2
25000 - 34999	2488	15.0	2427	16.9	2370	17.4
35000 - 49999	1103	6.8	1683	11.7	1845	13.5
50000 - 74999	263	1.6	679	4.7	793	5.8
>75000	114	.7	232	1.6	397	2.9
Total	16225		14341		13631	

Knox County

Income	1979 #HH	1979 %HH	1988Est. #HH	1988Est. %HH	1993Proj. #HH	1993Proj. %HH
<7499	4416	18.6	2894	13.7	2428	11.7
7500 - 9999	1811	7.6	1122	5.3	856	4.1
10000 - 14999	4589	19.3	2496	11.8	2028	9.7
15000 - 24999	6715	28.3	4732	22.3	4049	19.5
25000 - 34999	3810	16.1	4106	19.4	3619	17.4
35000 - 49999	1713	7.2	3495	16.5	3803	18.3
50000 - 74999	457	1.9	1734	8.2	2643	12.7
>75000	219	.9	597	2.8	1379	6.6
Total	23730		21176		20805	

Peoria County

Income	1979 #HH	1979 %HH	1988Est. #HH	1988Est. %HH	1993Proj. #HH	1993Proj. %HH
<7499	12565	17.1	8849	12.7	7652	11.2
7500 - 9999	4791	6.5	3059	4.4	2510	3.7
10000 - 14999	10013	13.6	6665	9.6	5475	8.0
15000 - 24999	20434	27.8	14640	21.1	12148	17.8
25000 - 34999	13486	18.4	12597	18.1	11205	16.5
35000 - 49999	7872	10.7	12336	17.8	12339	18.1
50000 - 74999	3110	4.2	7468	10.7	9801	14.4
>75000	1157	1.6	3875	5.6	6951	10.2
Total	73428		69489		68081	

Source: Donnelley Marketing Information Services. 1988.
Original data were derived from the Donnelley Files and converted to percentages.

Using the lowest and highest household income brackets for illustrative purposes, the preceding pattern persists for the nine township unit (Table IX-8). Approximately 1/5th of the households in 1979 earned $7,499 or less. This fraction decreased in 1988 and is projected to continue in that direction in the future. Notably, Elba Township is forecasted as having a high percentage of over $75,000 household income in 1993. This may be the result of erroneous data since the figure is so much higher than the adjacent townships. Table IX-9 and Figure IX-2 shows per capita income figures for the nine township unit. The township of Salem is distinquished by the largest rate of change in per capita income from 1979 to 1985 with a 38.6 percent rate of change.

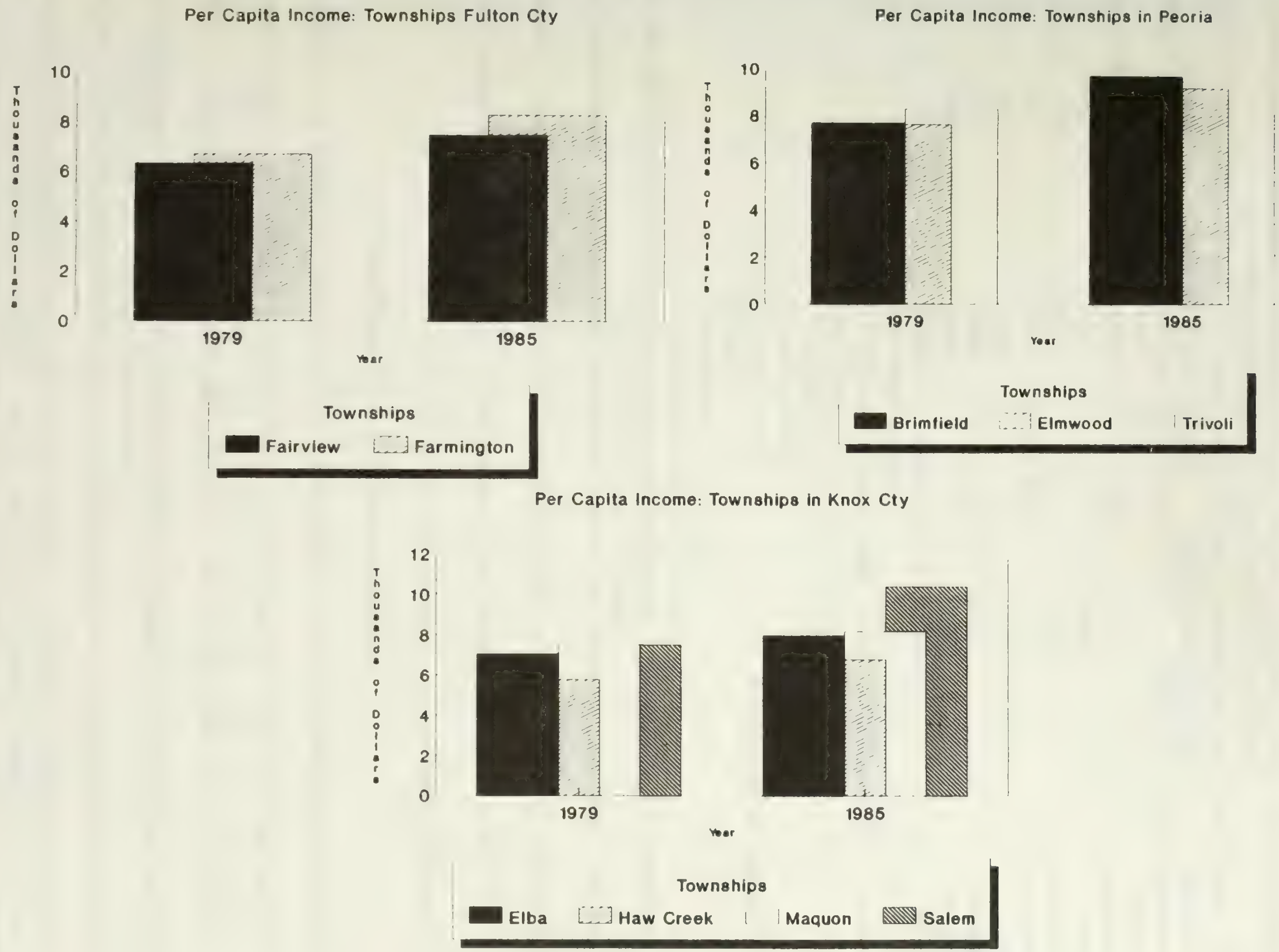
TABLE IX-8

HOUSEHOLD INCOME FOR THE NINE TOWNSHIP UNIT

	1979		1988Est.		1993Proj.	
	≤7499	≥75000	≤7499	≥75000	≤7499	≥75000
Township	%Household		%Household		%Household	
Fairview	20.1	0.0	18.4	.4	17.9	.8
Farmington	19.8	.4	14.9	1.0	13.5	2.8
Elba	17.1	0.0	11.2	5.6	8.9	12.2
Haw Creek	24.0	0.0	20.8	1.0	19.1	1.5
Maquon	18.8	2.9	14.2	3.9	12.5	5.7
Salem	15.8	1.1	11.9	2.1	10.8	5.
Brimfield	14.0	2.4	12.3	2.9	11.8	5.3
Elmwood	17.1	.2	15.0	.7	13.8	1.4
Trivoli	11.8	1.0	9.5	3.5	8.5	5.9

Source: Donnelley Marketing Information Services. 1988.
Original data were derived from the Donnelley Files and converted to percentages.

PER CAPITA INCOME FOR THE NINE TOWNSHIP UNIT



Source: U.S. Bureau of the Census. 1986.

FIGURE IX-2

TABLE IX-9

PER CAPITA INCOME FOR THE NINE TOWNSHIP UNIT

Township	1979 Per Capita Income	1985 Per Capita Income	%Change
Fairview	6311	7442	17.9
Farmington	6676	8262	23.8
Elba	7067	7974	12.8
Haw Creek	5799	6798	17.2
Maquon	7518	8186	8.9
Salem	7513	10414	38.6
Brimfield	7672	9685	26.2
Elmwood	7615	9187	20.6
Trivoli	8292	9486	14.4

Source: U.S. Bureau of the Census. 1986.

Population by Occupation

Occupation, as a component of demography crosscuts subsequent information on the economic infrastructure of the region (Section IXB) which concentrates on employment by industry rather than employees by occupation. It is not the intention of this section to address labor market issues, but to describe instead occupation as a demographic variable.

General occupations have been divided into 13 broad categories based on definitions provided by the 1980 Census (Table IX-10). The population universe includes employed persons over the age of 16. Fulton and Knox counties portray a similar sequence in occupation. Categories which contain more than ten percent of the employed population are the administrative support occupations including clerical, service occupations, precision production, repair and craft occupations, and machine operators inspectors and assemblers. Those that consist of less than five percent of the population are technicians and related support, private household occupations, protective services and farming, forestry and fishing occupations in Knox County.

Almost forty-one percent of those employed in Peoria County hold positions in executive, administrative, managerial, professional specialty, and administrative support occupations, seemingly the result of the availability of these types of positions in the Peoria metropolitan area (Table IX-11). Figure IX-3 illustrates the seven largest occupation sectors for each township.

TABLE IX-10

OCCUPATIONAL CATEGORIES

1	Executive, administrative, and managerial
2	Professional specialty
3	Technicians and related support
4	Sales
5	Administrative support including clerical
6	Private household
7	Protective services
8	Services
9	Farming, forestry, and fishing
10	Precision production, craft, and repair
11	Operators, fabricators, and laborers
12	Transportation and material moving
13	Handlers, equipment cleaners, helpers and laborers.

TABLE IX-11

OCCUPATION BY COUNTY (1980)

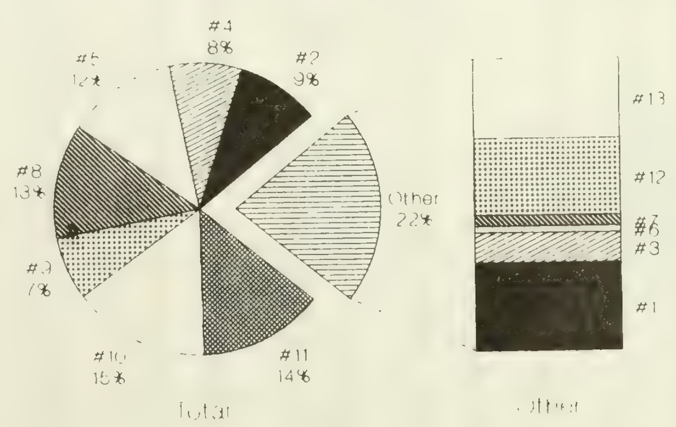
Percent Population in Each Occupation Category

County	1	2	3	4	5	6	7	8	9	10	11	12	13
Fulton	6.5	9.2	2.2	8.1	12.3	.5	.8	12.6	7.0	15.3	13.9	5.7	5.9
Knox	7.0	10.3	3.2	10.0	13.9	.5	1.0	13.4	4.8	10.7	13.5	6.7	5.0
Peoria	9.7	13.1	2.9	10.5	17.9	.5	1.6	11.6	1.2	11.8	10.0	4.2	5.1

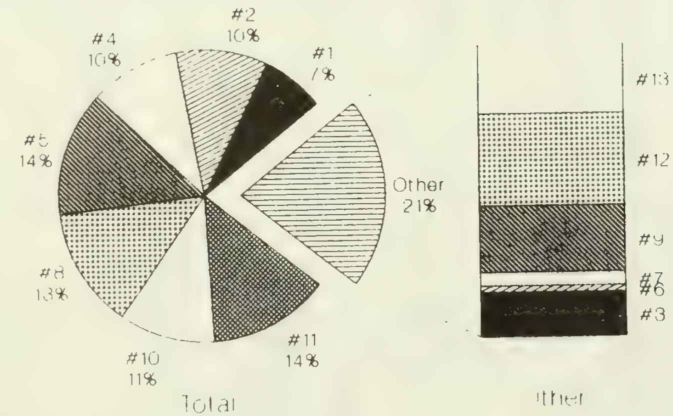
Source: Donnelley Marketing Information Services. 1988. Original data were derived from the Donnelley Files and converted to percentages.

Four different occupation categories are the major employment sectors in the nine township unit. Precision production, craft and repair occupations (10) is the largest sector in Farmington and Elmwood townships. Machine operators, assemblers and

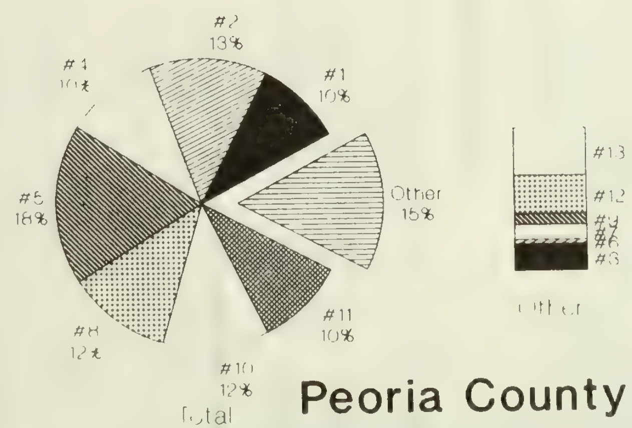
TRI-COUNTY POPULATION BY OCCUPATION



Fulton County



Knox County



Peoria County

Source: Donnelly Marketing Information Services. 1988.

Occupation Catagory

1 Executive/administrative/ managerial
2 Professional specialty
3 Technicians/related support
4 Sales
5 Administrative support/ clerical
6 Private household
7 Protective services
8 Services
9 Farming/forestry/fishing
10 Precision production/craft/ repair
11 Operators/fabricators/laborers
12 Transportation/material moving
13 Handlers/equipment cleaners/

FIGURE IX-3

inspectors (11) is the largest category in Fairview, Maquon and Salem townships. Farming, forestry and fishing (9) employs approximately 20 percent of the working residents in Haw Creek and Elba townships. Administrative support including clerical (5) is the highest ranking division in Brimfield and Trivoli. Additional statistics are presented in Table IX-12 for the nine township unit. A view of the occupation structure is provided in Figure IX-4.

TABLE IX-12

OCCUPATION WITHIN THE NINE TOWNSHIP UNIT (1980)

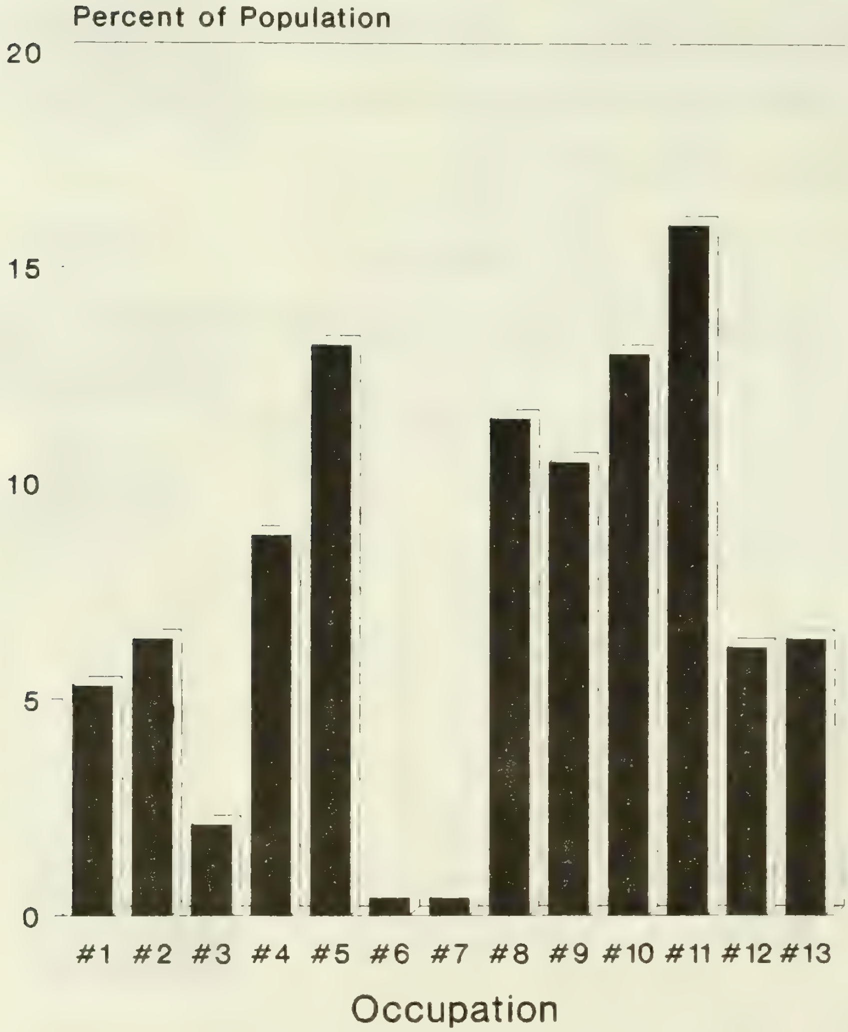
Percent Population in Each Occupation Category

Township	1	2	3	4	5	6	7	8	9	10	11	12	13
Fairview	7.9	8.5	1.3	1.9	11.9	1.3	1.3	10.1	14.2	12.6	18.2	5.0	6.0
Farmington	6.3	7.6	2.8	10.5	10.2	.4	.4	12.7	4.9	15.6	13.9	7.3	7.4
Elba	3.9	3.9	2.2	1.1	10.6	.6	0.0	8.9	32.4	10.6	15.1	7.3	3.4
Haw Creek	5.6	2.6	2.2	7.8	11.5	.7	.7	10.8	19.7	10.4	11.9	8.2	7.8
Maquon	4.5	6.6	.6	4.5	11.5	1.8	0.0	8.5	19.3	10.3	19.9	9.4	3.0
Salem	5.3	6.4	2.1	8.8	13.2	.4	.4	11.5	10.5	13.0	16.0	6.2	6.4
Brimfield	5.1	9.8	2.1	6.8	20.7	.3	.6	8.5	7.6	15.4	10.5	7.1	5.5
Elmwood	6.5	9.6	1.2	8.3	13.4	.6	1.2	9.3	6.3	20.7	10.8	6.0	6.1
Trivoli	5.7	9.4	2.6	4.7	19.8	.4	1.4	7.9	13.8	15.9	7.9	6.9	3.7

Source: Donnelley Marketing Information Services. 1988. Original data were derived from the Donnelly Files and converted to percentages.

FIGURE IX-4

OCCUPATIONS IN SALEM TOWNSHIP



1 Executive/administrative/ managerial
2 Professional specialty
3 Technicians/related support
4 Sales
5 Administrative support/ clerical
6 Private household
7 Protective services
8 Services
9 Farming/forestry/fishing
10 Precision production/craft/ repair
11 Operators/fabricators/laborers
12 Transportation/material moving
13 Handlers/equipment cleaners/

Source Donnelly Marketing Information Services 1988

B. EXISTING ECONOMIC INFRASTRUCTURE

The existing economic infrastructure for the Salem Township, Knox County petition area is evaluated from a regional tri-county perspective, similar to the presentation in the demographic section (IXA). In general, the smallest unit of analysis which provides a comprehensive picture of the area is the county, though features on the township level will be addressed when data is available. As with the prior demographic information comparability problems exist between sources. Again, different benchmark years are used as baselines, units of analysis are nonequivalent, and the definition of terms are not necessarily standardized. Several sources will be employed here, some of which use discrete methods for acquiring and categorizing data. However, the purpose is to present an overall view which will convey the economic climate of the region from several vantage points. This section will include 1) a general description of the labor market characterized by unemployment patterns and industry trends; and 2) an outline of the economic infrastructure by industry.

Labor Markets

Regional business fluctuations affect labor comparisons. Periods of increased unemployment are the result of the interaction of a number of factors. These include, seasonal labor demands, labor strikes, plant layoffs, plant shutdowns and increased operating efficiencies. Rising unemployment may be transitory and due to temporary labor and market phenomena, or of a structural nature characterized, for example, by permanent plant closings. The unemployment levels in Table IX-13 reveal a changing relationship between labor supply and demand as represented by the zigzag line (Figure IX-5). Essentially, unemployment has been on the downswing since

1986, and a glimpse of 1989 figures through November substantiates a further decrease in unemployment (Table IX-14).

TABLE IX-13

TRI-COUNTY UNEMPLOYMENT LEVELS

County	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Fulton	5.4	8.1	9.1	15.4	17.3	14.4	14.6	12.1	11.4	9.5
Knox	7.1	13.8	1.5	14.8	14.8	12.8	15.7	13.0	9.7	8.3
Peoria	5.6	8.4	8.4	14.2	16.4	11.5	11.0	9.0	8.3	6.9

Source: Illinois Department of Employment Security. 1989a.

TABLE IX-14

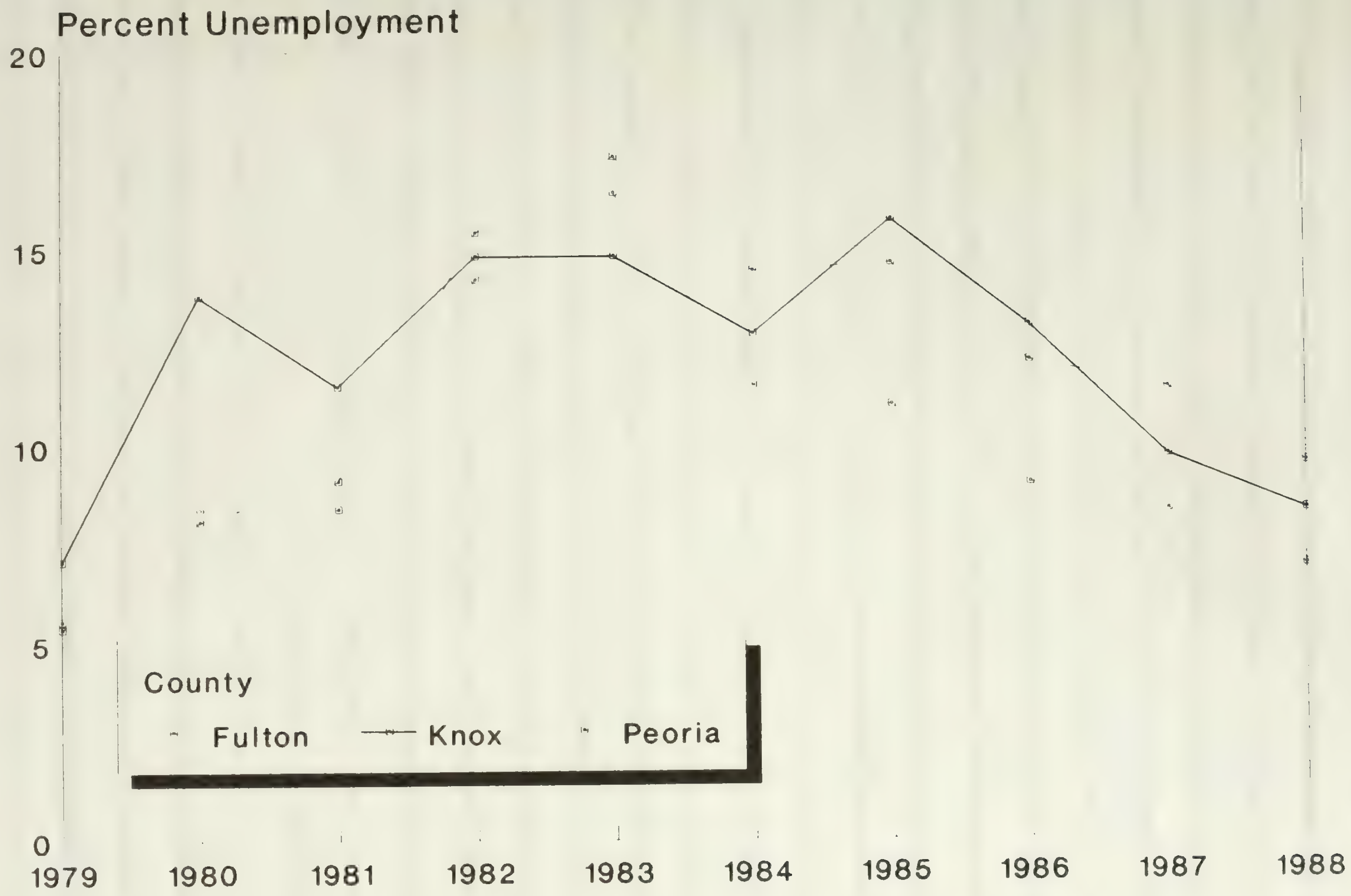
TRI-COUNTY UNEMPLOYMENT LEVELS FOR 1989

County	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
Fulton Data not available											
Knox	7.0	6.7	6.4	6.0	5.7	5.5	5.9	6.8	5.6	6.5	6.5
Peoria*	6.5	6.3	6.0	5.6	5.7	5.7	5.2	5.8	5.4	6.2	6.1

Source: Illinois Department of Employment Security. 1989b.
* Peoria comprises the Peoria SMSA (Peoria,Tazewell, Woodford counties)

The tri-county unemployment pattern illustrated in Figure IX-5 parallels the national increase in unemployment during the 1980 and 1982 recessions. The following local scenario will help interpret unemployment levels for the tri-county region from 1980 through 1989. Fulton County is closely tied to Peoria County's labor force, so much so, that it may be included in the Peoria SMSA in the 1990 census. Hence, factors effecting employment in Peoria will impact Fulton County heavily. In the early 1980's Pabst Brewery closed three plants laying off a large number of employees.

TRI-COUNTY UNEMPLOYMENT LEVELS



Source: Il. Dept. Employment Security & U.S. Bureau of Labor Statistics. 1989a.

FIGURE IX-5

Additionally Hiram Walker closed its plant during that period. There had been considerable downsizing of the facilities beginning in the early 1970's when Pabst and Walker employed over 13,000 persons. Between 1982 and 1985, Caterpillar continued downsizing its establishment. This downswing was compounded as smaller companies began eliminating staff at the same time in response to Caterpillars action. In 1987 Caterpillar called back 1,300 of its workers. At that time the University of Illinois Medical School, through Methodist and St. Francis hospitals was beginning to increase its employment. In 1989 the American-Korean consortium of Union Sangyo, producers of oil filters, was formed. Komatsu merged with Dresser a mining truck operation.

In Galesburg, Knox County, Mecco Coal Mine closed in 1980 laying off approximately 220 employees. In 1982 Outboard Marine moved its lawnmower facility to Mississippi leaving 800 employees out of work. In January of 1983 Burlington Northern began its $75,000,000 modernization program which could have been a catalyst to the drop in unemployment in 1984. In 1987 and 1988 the Admiral plant was in a period of continued modernization to the amount of $50,000,000. (Company closings and openings provided by Wallace Biermann, Department of Commerce and Community Affairs, Research and Analysis, personal communication, February 1990).

The condition of a region's economy is often signalized by the annual growth rate in earnings by industry. The economic infrastructure of the tri-county region between the decade 1977-1987, shows an average annual growth rate in earnings by industry, of 1.2 percent in Fulton County, 3 percent in Knox County, and 3.9 percent in Peoria County. For all three counties, the largest industry in 1987 was the service industry. In Fulton County, state and local government and transportation and public utilities

contributed a large percent to the county's earnings. In 1977 the largest industries in Fulton were mining and durable goods manufacturing followed by services. Of the industries that accounted for at least five percent of earnings in 1987, the slowest growing between 1977-87 was the farm industry, and the fastest growing was transportation/ public utilities.

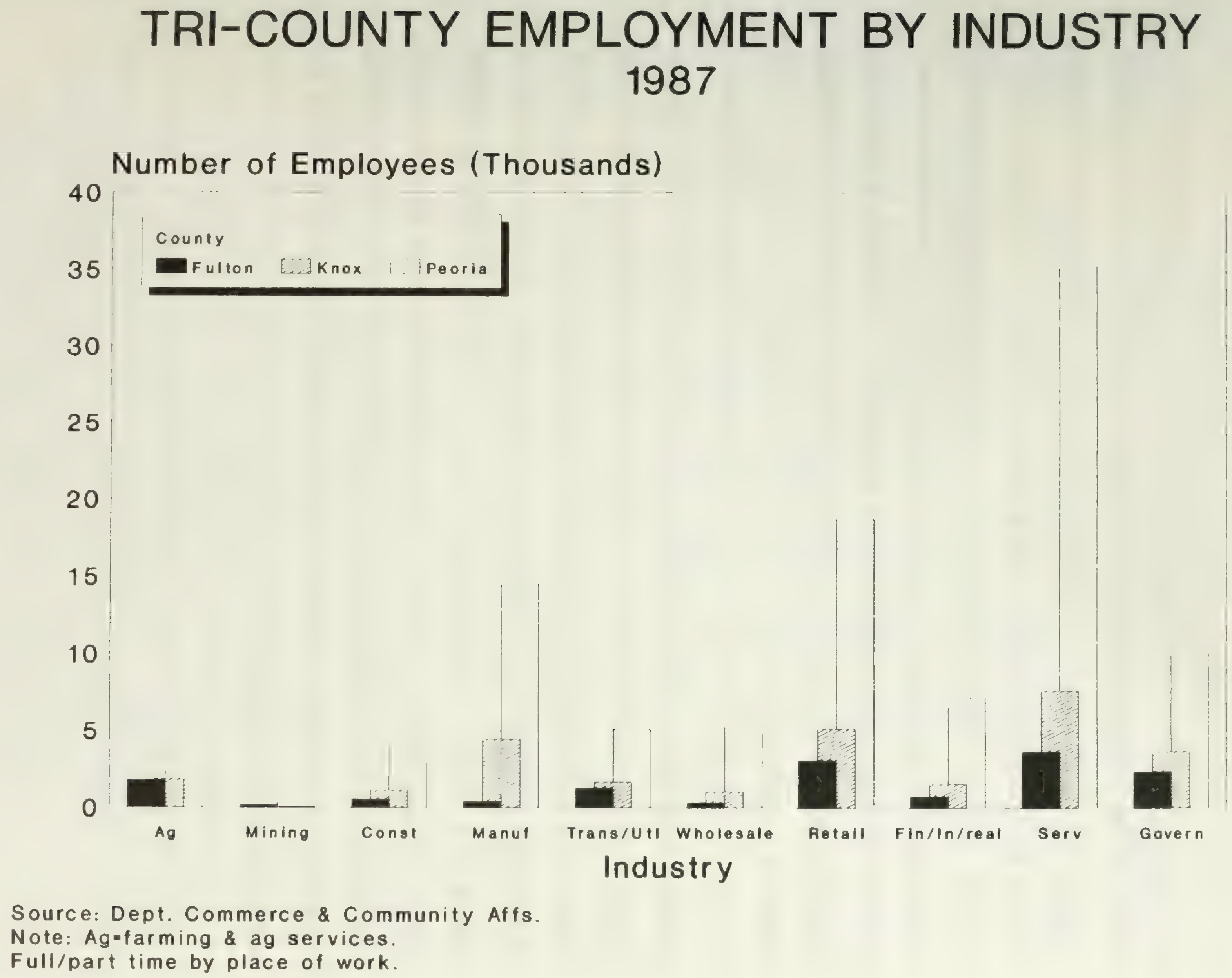
In Knox County in 1987, after the service industry, durable goods manufacturing, and state and local government contributed the largest amount of earnings to the economy. In 1977 the largest industries were durable goods manufacturing, services, and transportation and public utilities. Of the industries that accounted for at least five percent of earnings in 1987, the slowest growing from 1977-87 was durable goods manufacturing and the fastest was services.

In Peoria County in 1987, following the service industry, durable goods manufacturing and retail trade accounted for a large percent of the earnings in that county. In 1977 the largest industries were durable goods manufacturing, services and retail trade. Of the industries that accounted for at least five percent of the earnings in 1987, the slowest growing from 1977-87 was construction and the fastest was services.

A large datafile called the Dun and Bradstreet Market Identifiers has been employed to review the numbers and types of business establishments, plants, and facilities present in the tri-county region. The Dun and Bradstreet Corporation is responsible for compiling proprietary information on over seven million businesses throughout the United States and Canada. Not all establishments are represented in this file (Duns Marketing Services 1989).

The tri-county region has approximately 9,837 recorded business establishments and facilities according to the Dun and Bradstreet Market Identifiers database (1989). Two-thirds of the businesses are associated with the service industry (32%), retail trade (26%), and construction (10%). Within the nine township unit, there are 493 establishments recorded in the database. These numbers may be slightly exaggerated for the following reason. This estimation is based on the distribution of zipcodes in the nine townships and their relationship spatially to zipcodes of businesses in the Dun and Bradstreet datafile. By linking zipcodes between the two files it is possible to pull-out establishments within the nine township unit. Some of the zipcode boundaries, however, extend outside the nine township unit, so several additional towns by address are embodied in the unit. The additional towns are contiguous to the nine township unit, as close as within three miles of the perimeter. Those towns falling outside the area but used in the recorded number of businesses are Dahinda, Gilson, Laura, London Mills, Norris, Trivoli, and Williamsfield. Some of the businesses are physically located within the nine township boundary. The three most represented industries in the nine township unit are agriculture, retail trade and services.

The remainder of this section takes a closer look at individual industries. Figure IX-6 depicts the total industry base represented by the number of employees in each industry.



TRI-COUNTY EMPLOYMENT BY INDUSTRY
1987
Number of Employees (Thousands)
40
35
30
25
20
15
10
5
0
County
Fulton
Knox
Peoria
Ag
Mining
Const
Manuf
Trans/Utl
Wholesale
Retail
Fin/In/real
Serv
Govern
Industry
Source: Dept. Commerce & Community Affs.
Note: Ag=farming & ag services.
Full/part time by place of work.

FIGURE IX-6

Agriculture

Since 1850, when minimum criteria defining a farm for census purposes were first established, the farm definition has been changed a number of times. The present definition first used in the 1974 agricultural census, is any place from which $1,000 or more of agricultural products were produced or sold during the census year. Moreover, the U.S. Census of Agriculture uses farm operating units as the basis for its agricultural land summary. Agricultural lands may include woodland, pasture, cropland and house lots, ponds, roads and wastelands. Land in farms includes land owned and operated, as well as, land rented from others (U.S. Bureau of the Census 1987a).

Illinois is often depicted as an agricultural state. In terms of land use, or land in farms, Fulton and Knox counties are firmly entrenched in this tradition. Even Peoria County, to a lesser degree, has a relatively large agricultural base in spite of its Metropolitan Statistical Area (SMSA) status. The interval between 1978-1987 is marked by a decline in the number of farms, and a corresponding but modest attrition of land devoted to farming. But, as the number of farms decreased during this time frame, the average acreage increased (Table IX-15). Fulton County is the exception: land in farms increased 6.7 percent between 1982 and 1987, plus the average farm size increased as well.

TABLE IX-15

AGRICULTURAL LANDUSE CHARACTERISTICS

County	#Farms Avg. 1978	1982	1987	Farm Size 1978	1982	1987	%Land In Farms 1978	1982	1987
Fulton	1502	1440	1371	288	293	335	77.1	75.7	82.4
Knox	1346	1301	1165	308	313	347	88.9	88.4	87.9
Peoria	1191	1161	1102	245	242	263	73.1	70.8	72.9

Source: U.S. Bureau of the Census. 1978.
U.S. Bureau of the Census. 1987a.

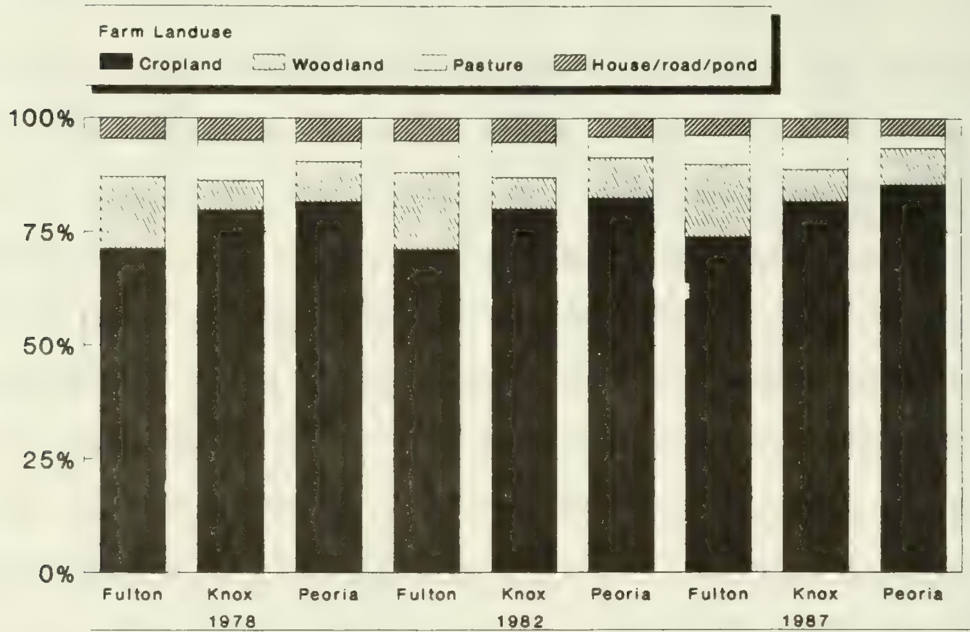
As dipicted in Figure IX-7, the majority of agricultural land is designated cropland. Although Fulton County has devoted approximately 20 percent of their agricultural land to woodland pasture/nonpasture status, Knox County has the largest market in livestock and poultry, as approximately half of the market value of agricultural product comes from livestock and poultry sales (Figure IX-8). In terms of farms by value of sales (1987), Knox County maintains the fewest farms with sales less than $2,500, and the largest number of farms with sales over $100,000. The largest number of farms in both Fulton and Peoria counties have a median value of sales of $10,000-24,999 (Figure IX-8).

The tenure of farmlands in Fulton, Knox and Peoria counties from 1978 through 1987 has changed little. There have been no major shifts in landholdings; roughly 50 percent of the farms are in full owner status, 30 percent are in part owner status, and 20 percent are tenant status (Figure IX-7). However, a reduction in farm employment is evident. Farm employment decreased between 1977 and 1987 by 25 percent in Fulton County, 20 percent in Knox County, and 11 percent in Peoria County (Figure IX-9).

FIGURE IX-7

AGRICULTURAL LANDUSE AND TENURE

Agricultural Landuse



Source: U.S. Bureau of the Census. 1987a.

Farms By Tenure

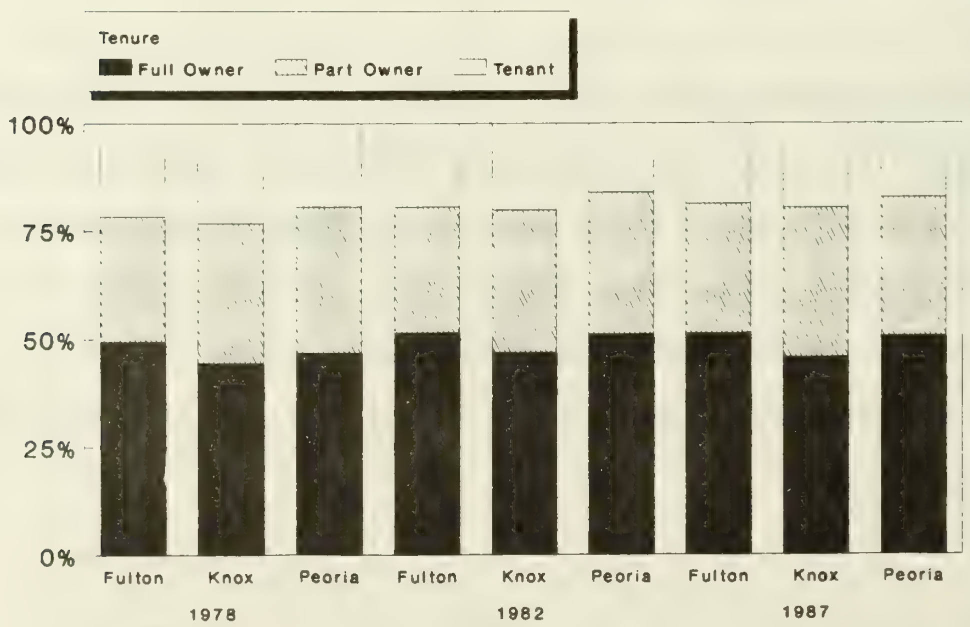
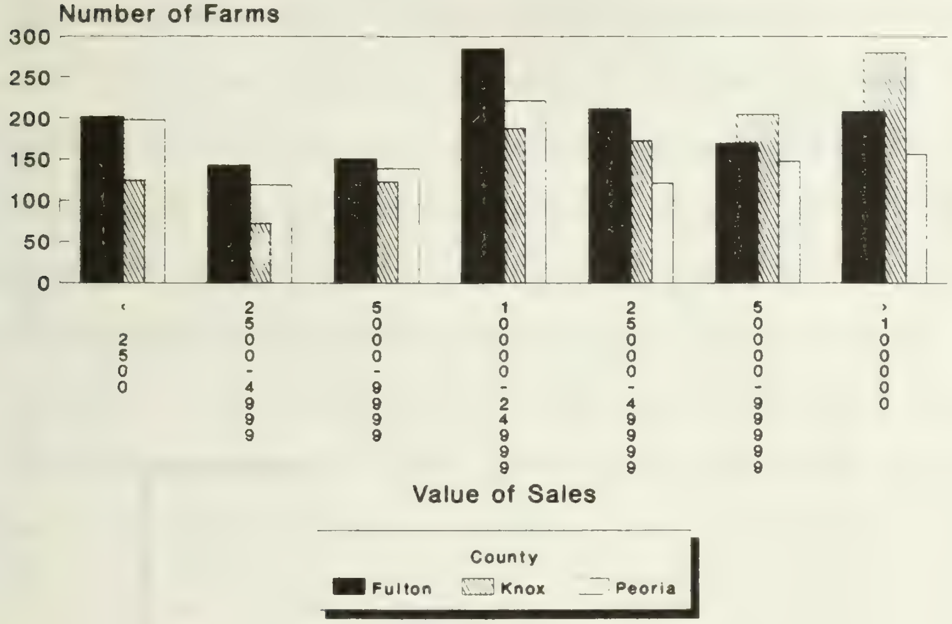


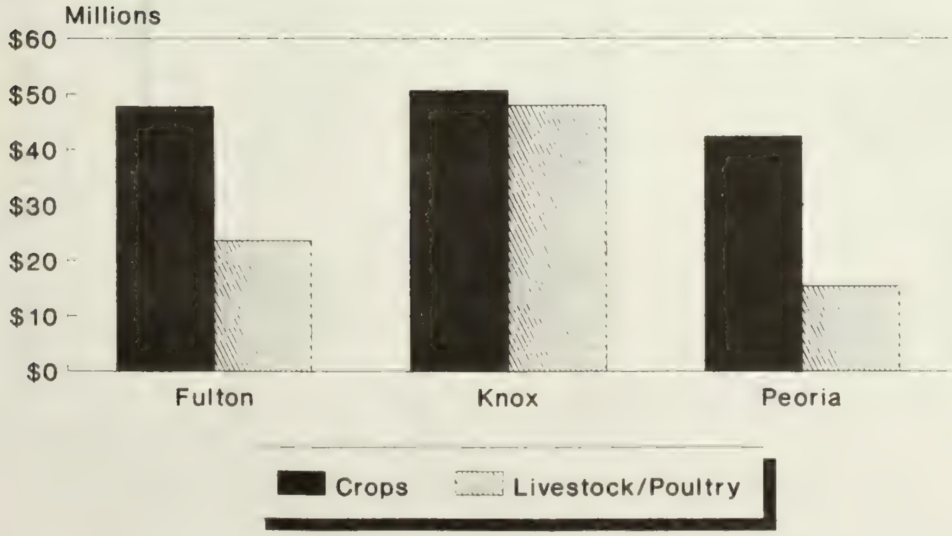
FIGURE IX-8

AGRICULTURAL SALES AND MARKET VALUES

Farms By Value Of Sales: 1987

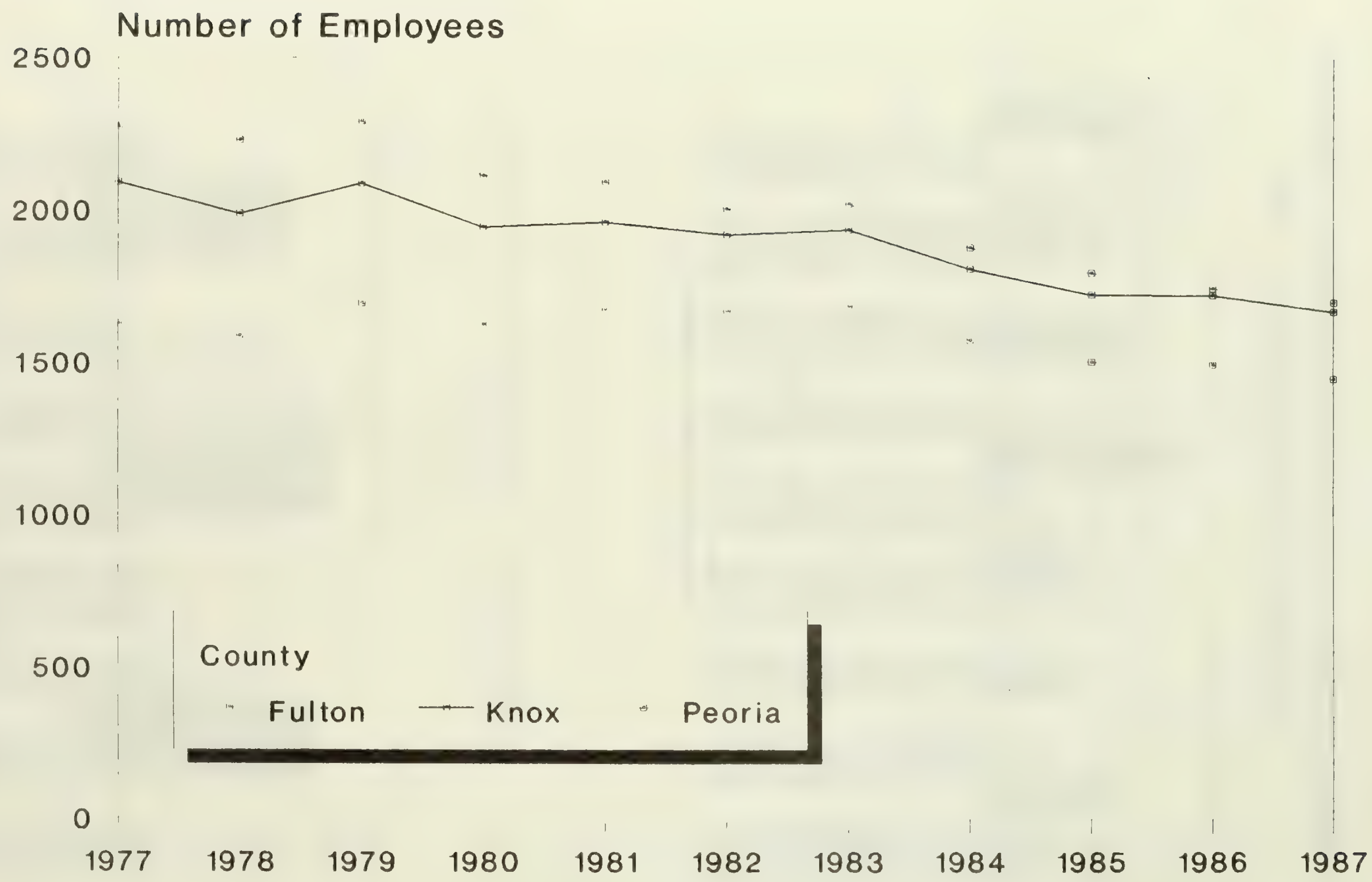


Market Value Of Agricultural Products 1987



Source: U.S. Bureau of the Census. 1987a.

FARM EMPLOYMENT



Source: Dept. Commerce & Community Affs.
Note: Full/part time by place of work.
This excludes ag services.

FIGURE IX-9

Noticeably, Knox and Fulton counties rate among the top ten counties in a number of categories. Of the counties leading in the production of oats, in 1988, Knox County ranked 10th. In the same year, Fulton County placed 3rd in all hay production, and Knox County followed 4th. Knox County ranked 5th in soybean yield in 1988. In January of 1989, Knox was 2nd in their inventory of the number hogs and pigs, and 3rd in beef cow inventory. Corn is an important agricultural commodity in the area. In 1988 corn yield in Fulton County was 62 bushels per acre and 7,555,000 total production (122,400 acres harvested for grain). In Knox County yield was 63 bushels per acre and 9,439,300 total production (150,500 acres harvested for grain). Yield per acre in Peoria County was 62 bushels per acre and 6,925,500 total production (112,200 acres harvested for grain (Illinois Agricultural Services 1989). Table IX-16 is a preliminary characterization of several agricultural commodities in 1988.

TABLE IX-16

STATISTICS FOR SELECTED AGRICULTURAL COMMODITIES

	Fulton	Knox	Peoria
Crop Values $			
Corn for Grain	19,781,800	24,715,600	18,133,500
Soybeans for Beans	21,882,700	21,649,100	15,521,300
Wheat	2,055,000	667,400	1,515,100
Oats	238,700	653,000	288,900
Sorghum	11,300	10,600	9,590,300
All Hay	9,632,000	9,590,300	5,006,600
Livestock $			
Hogs/Pigs	5,089,400	11,593,500	2,482,500
All Cattle	18,264,700	20,444,000	9,758,700

Source: Illinois Agricultural Services. 1989.

Of the business establishments and facilities in the tri-county area, compiled by Dun and Bradstreet, a total of six percent are devoted to agricultural endeavors of production of crops and livestock and agricultural services. This fraction increases drastically as one outlines the nine township unit. One-hundred and twenty establishments from a total of 493 are in the agricultural business line. That figure is over 24 percent of all establishments found in the Dun and Bradstreet database for the nine township unit (Dun's Marketing Services 1989).

Mining

The mining industry in the tri-county region has mimicked the state pattern. Mining employment has plummeted since 1977 (Figure IX-10), especially in Fulton County where mining maintained a prominent role in the labor market for so long. Figure IX-10's statistics are derived from County Profiles provided by the Department of Commerce and Community Affairs, and reflect aggregate numbers of miners of various types, and support staff. The proceeding information (Table IX-17) was provided by DMM (1990), and illustrates the same pervasive trend using slightly different figures.

TABLE IX-17

MINING STATISTICS

	Fulton		Knox		Peoria	
Year	Mines	Employees	Mines	Employees	Mines	Employees
1980	4	620	1	121	1	130
1981	3	609	0	0	1	124
1982	3	597	0	0	1	117
1983	3	525	0	0	1	115
1984	2	184	0	0	1	25
1985	1	133	0	0	0	0
1986	1	140	0	0	0	0
1987	1	135	0	0	0	0
1988	1	104	0	0	0	0
1989	1	100	0	0	0	0
1990	1	79	0	0	0	0

Source: Illinois Department of Mines and Minerals. 1990.
Note: This does not include carbon recovery operations.

As demonstrated in Table IX-17, the percent of change over the decade in Fulton County was marked by an 87 percent decrease in mining employment. In Knox County there was a 100 percent plunge in employment, and equally dismal figures are present for Peoria County.

The most optimistic projection for the mining industry in the tri-county region is the continuation of present mining and employment levels: most however, agree that the mining industry is precipitous. In 1989 there were approximately 60 million tons of coal mined in Illinois; approximately 1/2 million tons of that total, from the tri-county area. This figure accounts for less than one percent of the coal mined in Illinois. Chapter X provides a comprehensive evaluation for the supply and demand for coal, specifically concentrating on the petition area reserves.

MINING

Source: Dept. Commerce & Community Affs.
Note: Mining=all mining + ofc staff.
full/part time by place of work.

FIGURE IX-10

Construction

The construction industry in Fulton and Knox counties between 1977 and 1987 has remained relatively stable. In Knox there was a marginal increase in 1979 and a marginal decrease in 1981, but after that there was very little change. Peoria County's figures portray a slightly different scenario. From 1981 to 1984 there was a steep decline in construction employees, tapering off in subsequent years (Figure IX-11). Construction was the slowest growing industry between 1977 and 1987 in Peoria County, however, construction projections reveal an upward trend (Table IX-18).

TABLE IX-18

ECONOMIC FORECAST - CONSTRUCTION

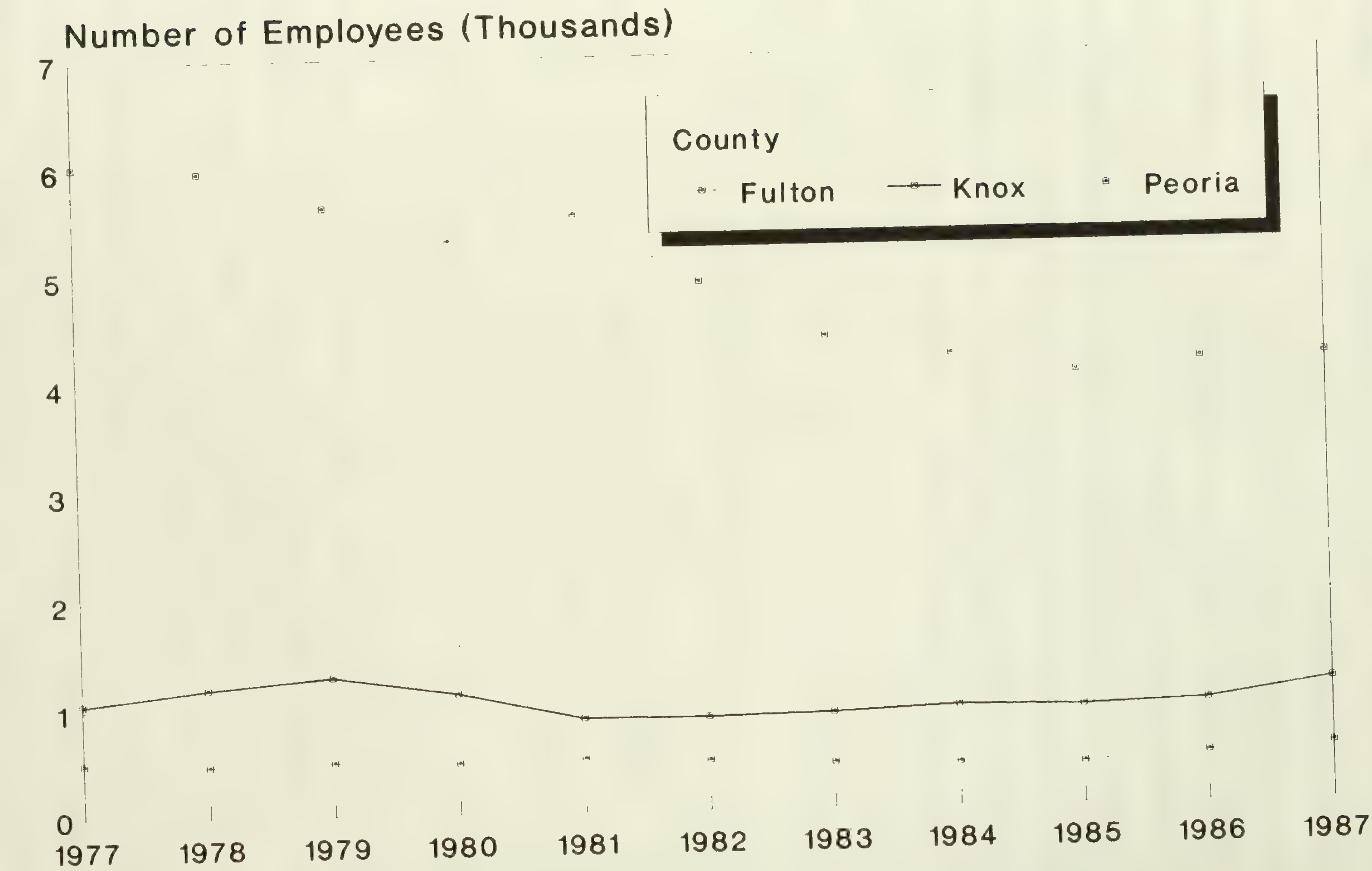
	%Growth		
County	1987-1991	1991-1995	1995-2000
Fulton	4.2	2.3	0.3
Knox	0.4	-0.1	-0.7
Peoria	7.0	2.2	0.7

Source: State Economic Service. 1989.

Based on 1989 Dun and Bradstreet records, there are 948 establishments and facilities or businesses devoted to the construction industry under the headings of general building contractors, heavy construction contractors or special trade contractors in the tri-county area. One-hundred and eighteen are located in Fulton County, 179 are located in Knox County, and 651 are found in Peoria County. Of these businesses, 44 are located in the nine township boundary surrounding the petition area. Over half of these establishments are specialized trade contractors, which include plumbing, heating and air conditioning services, painting and paper

hanging, electrical work, carpentry and floor laying, water well drilling, and excavating and foundation work.

CONSTRUCTION



Source: Dept. Commerce & Community Affs.
Note: Full/part time staff by
place of work.

FIGURE IX-11

Manufacturing

The manufacturing industry crosscuts all areas of production ranging from food and kindred products, to apparel and furniture, chemicals, metals, equipment and instruments. The manufacturing industry in Fulton and Knox counties between 1977-1987 shows a gradual but persistent decline in the number of employees (Figure IX-12). In Fulton County in 1977 the manufacture of durable goods was the 2nd largest industry in terms of earnings. In Knox County in 1977, durable goods manufacturing contributed most to the economy, but by 1987 had dropped to 2nd position. In 1977 in Peoria County, the manufacture of durable goods was the primary industry in terms of earnings. The number of employees plummeted in 1983, then increased and stabilized by 1984. By 1987 durable goods manufacturing had still maintained 2nd place in earnings by industry. Table IX-19 reveals the economic growth projections from 1987-2000.

TABLE IX-19

ECONOMIC FORECAST - MANUFACTURING

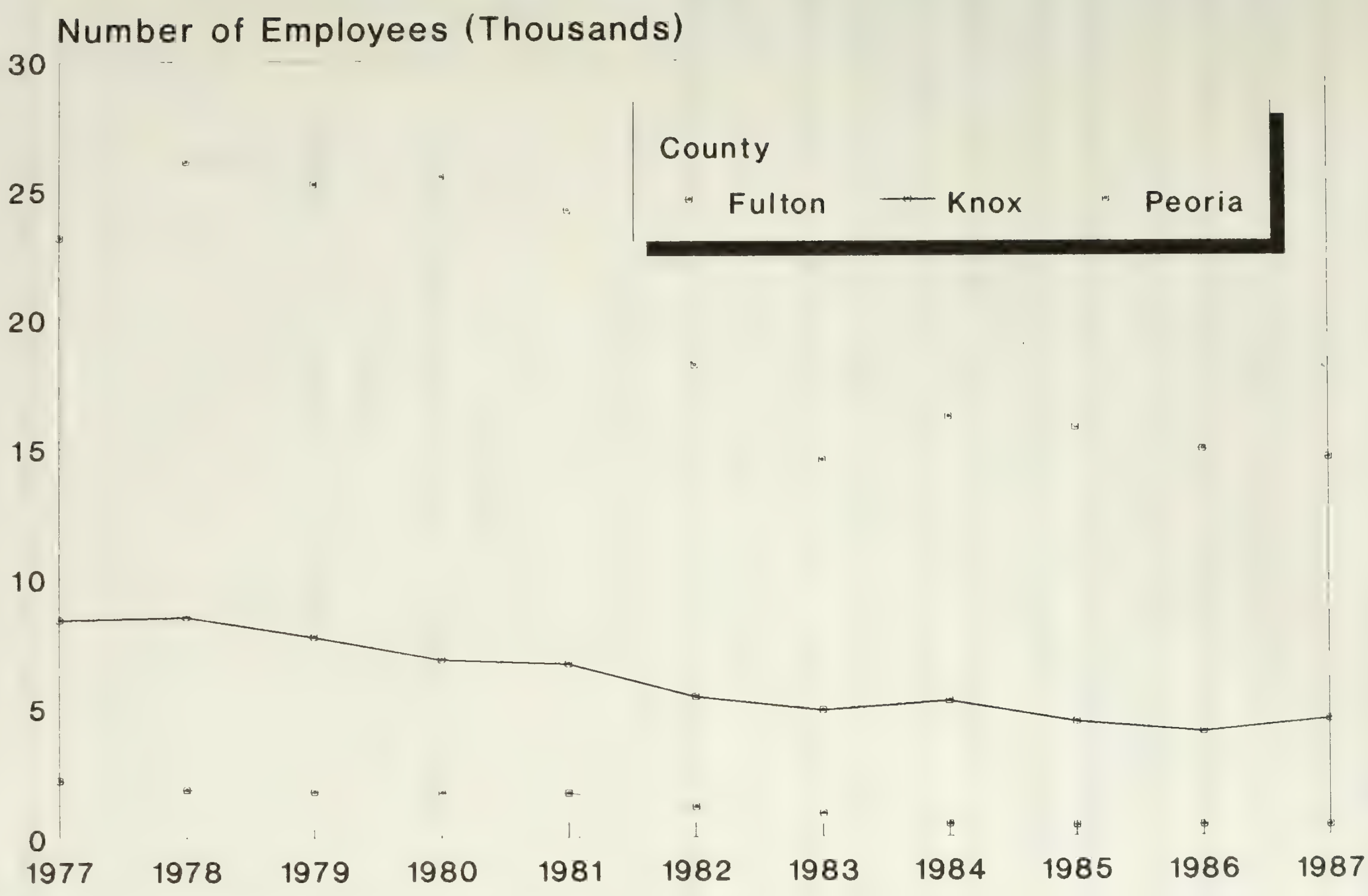
	%Growth		
County	1987-1991	1991-1995	1995-2000
Fulton	-4.4	-4.8	-1.9
Knox	-5.7	-4.6	-2.3
Peoria	4.9	1.2	0.9

Source: State Economic Service. 1989.

Based on 1989 Dun and Bradstreet records, there are 460 manufacturing establishments in the tri-county region; 35 in Fulton, 72 in Knox and 353 in Peoria. Twenty-five percent of the total manufacturing establishments are affiliated with printing and publishing, and 14 percent are in the business of manufacturing industrial machinery and equipment.

Within the nine township unit, there are eleven very diverse manufacturing operations including manufacturers of plastic pallets, newspaper publishing, cut stone, off road materials, sawmill and sawmill machinery, burial vaults, teddy bears, and potato chips.

MANUFACTURING



Source: Dept. Commerce & Community Affs.
Note: Full/part time staff by place of work.

FIGURE IX-12

Transportation and Public Utilities

The transportation and public utility industry is comprised of railroad transportation, local and interurban passenger transit, trucking and warehousing, U.S. postal service, water and air transport, transportation services, pipelines, communications; and electric, gas, and sanitary services. This industry is marked by a steady increase in Fulton County between 1977-1987: correspondingly, it was also the fastest growing industry during that decade in terms of earnings. In Knox County, the industry remained relatively consistent from 1977 to 1981, at which point a downturn ensued until 1983. In 1977 transportation and public utilities was the 3rd largest contributor to the counties economy. The 1983 downswing tapered off and numbers remained steady until 1987. Figures are comparatively stable for Peoria. A small augmentation of employees occurred from 1979 to 1981 and subsequently stabilized (Figure IX-13). Table IX-20 illustrates growth projections from 1987-2000.

TABLE IX-20

ECONOMIC FORECAST - TRANSPORTATION/PUBLIC UTILITY

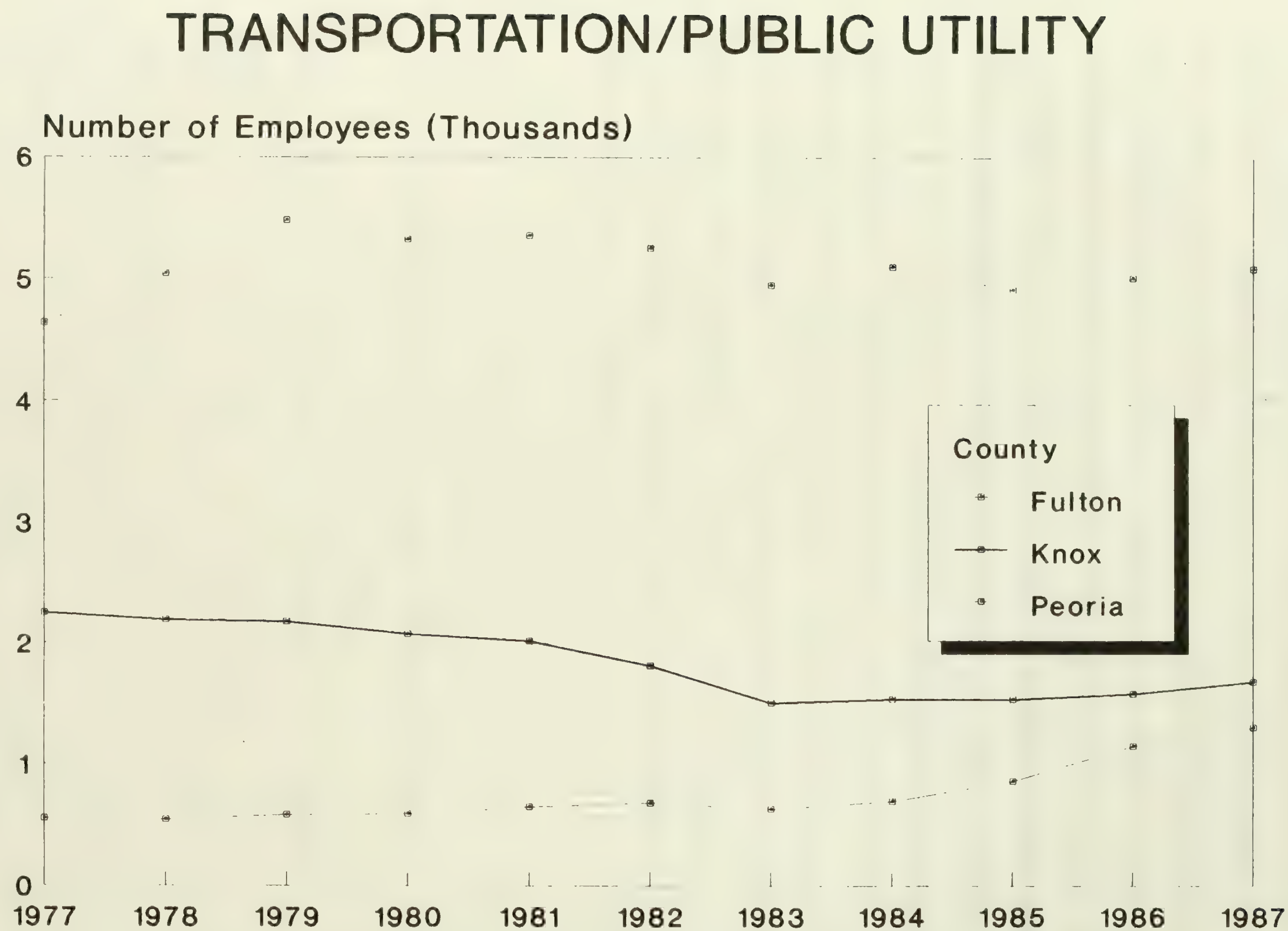
	%Growth		
County	1987-1991	1991-1995	1995-2000
Fulton	1.3	0.5	-0.1
Knox	1.6	-1.1	-0.8
Peoria	1.3	0.4	0.1

Source: State Economic Service. 1989.

A compilation of 422 establishments associated with the transportation and public utility industry can be found in the tri-county region, according to Dun and Bradstreet's datafile (1989). Of these, 373 are concerned with transportation, and 49 are utility related. Seven are located in Fulton County, 91 can be found in Knox

County, and 278 reside in Peoria County. Of these, 59 percent are trucking and warehousing establishments, 14 percent are communication facilities, and 10 percent are involved in transportation services.

Inside the limits of the nine township unit there are 27 businesses connected to transportation and public utilities. Twenty of the 27 businesses are local and nonlocal trucking operations. Utilities are represented by Central Illinois Light Company, and communications by Yates City Telephone Company.



Source: Dept. Commerce & Community Affs.
Note: Full/part time staff by
place of work.

FIGURE IX-13

Wholesale Trade

The wholesale trade industry includes durable and nondurable items ranging from automotive parts and supplies to jewelry and precious stones, and from footwear to fish to flowers. Judging from Figure IX-14, wholesale trade in Fulton and Knox counties has maintained the status quo from 1977 to 1987. There has been virtually no change in the employment pattern during that decade. Peoria County shows a high curve of employment from 1977 to 1981, then a steady decline until 1983 with steady levels continuing through 1987. Table IX-21 portrays the economic forecast for trade combining both wholesale and retail from 1987-2000.

TABLE IX-21

ECONOMIC FORECAST - TRADE

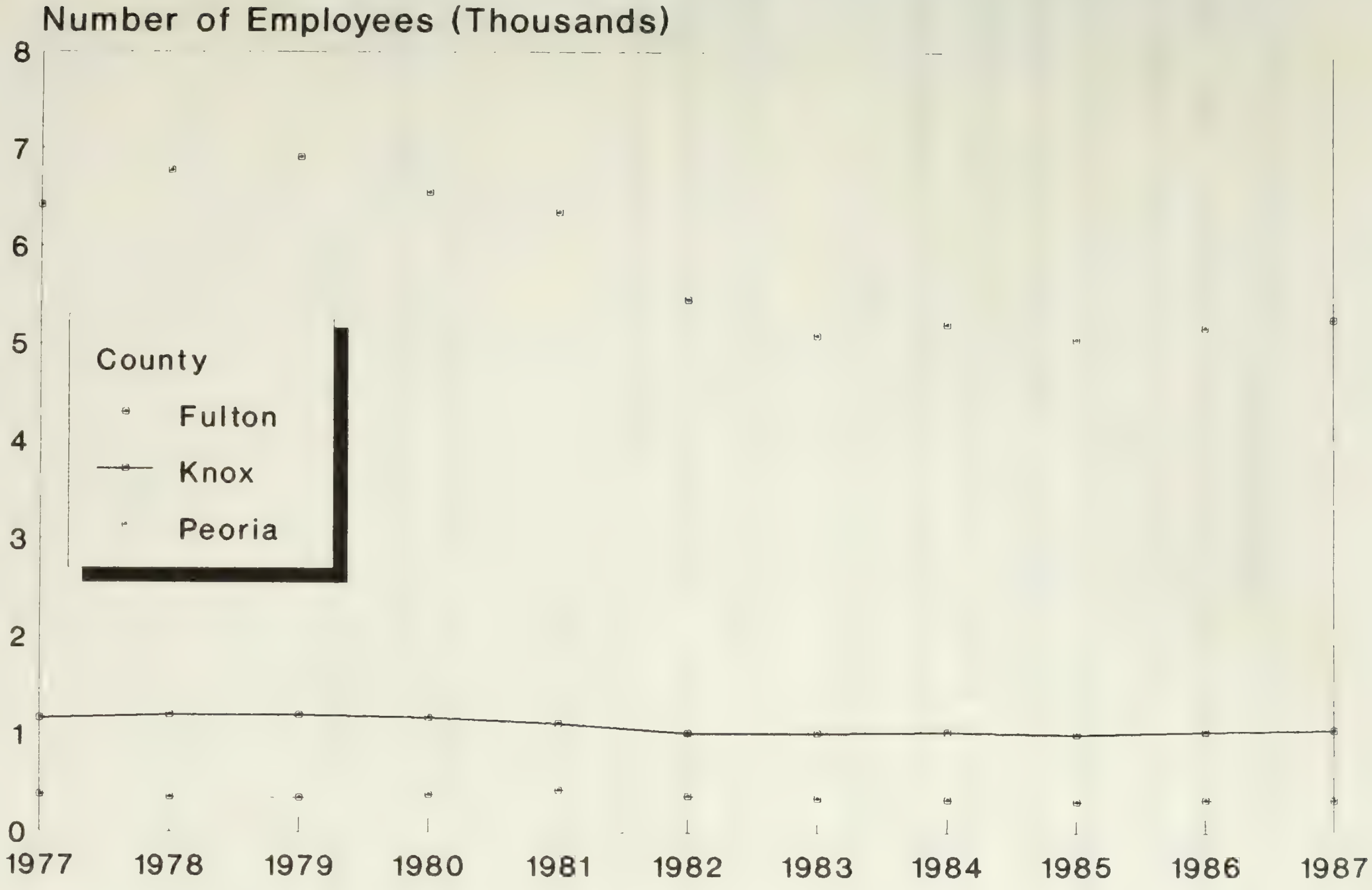
County	%Growth 1987-1991	1991-1995	1995-2000
Fulton	0.8	0.9	0.8
Knox	1.1	-0.7	-0.1
Peoria	0.9	1.0	1.0

Source: State Economic Service. 1989.

Within the tri-county area, there are 745 establishments devoted to wholesale trade (Dun and Bradstreet Market Identifiers 1989). Four-hundred and sixty-four trade in durable items, and 281 in non durable goods. Within Fulton County there are 63 establishments. There are 117 in Knox County and 565 in Peoria County. The six leading wholesale trade facilities in order of frequency are industrial machinery and equipment, farm supplies, automotive parts and supplies, industrial supplies, electrical equipment, and grain.

There are 38 facilities in the nine township unit. Of these, 21 are related to agriculture with the selling of farm machinery, grain and field beans and livestock, and other farm supplies.

WHOLESALE TRADE



Source: Dept. Commerce & Community Affs.
Note: Full/part time staff by
place of work.

FIGURE IX-14

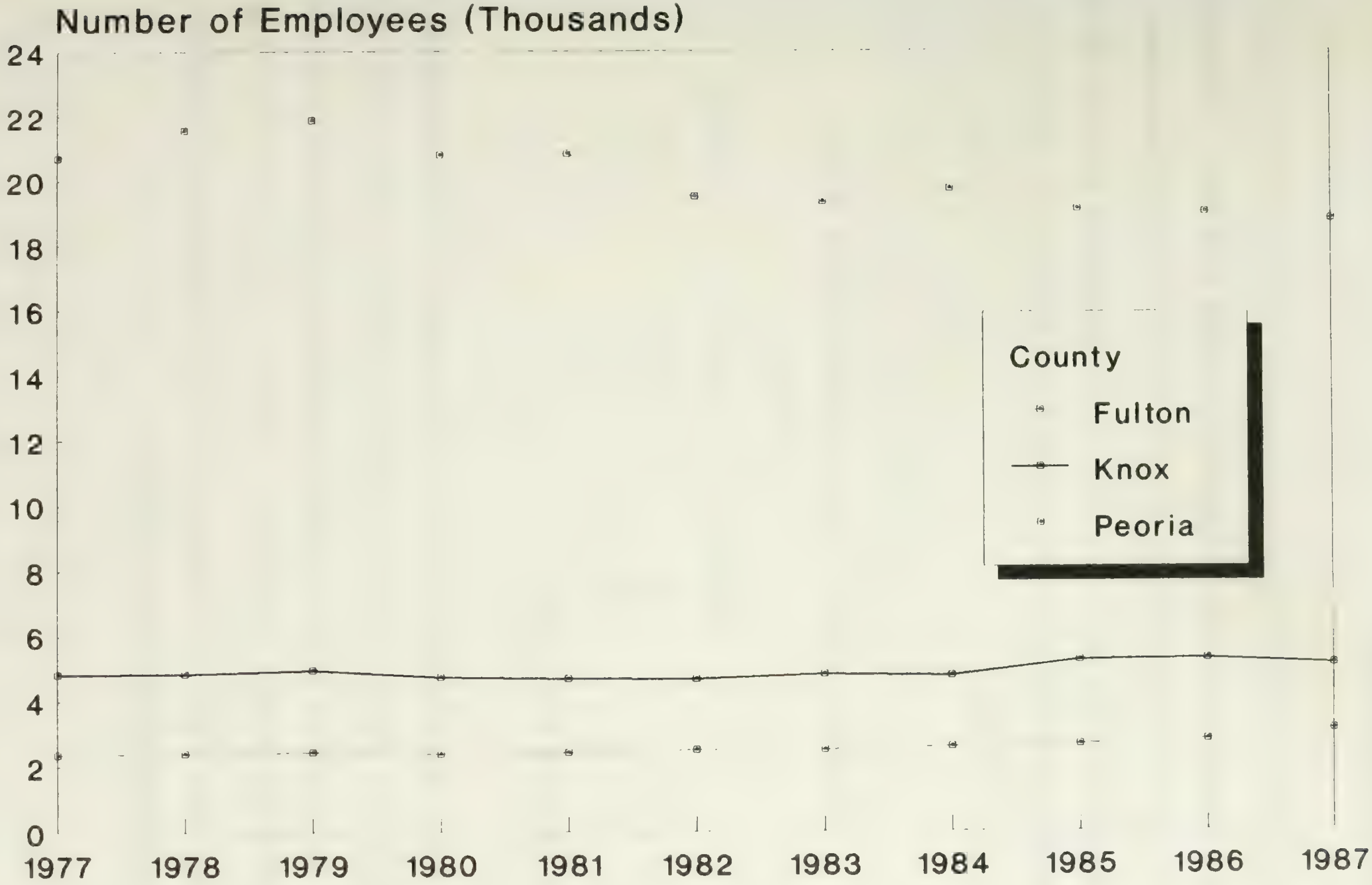
Retail Trade

Retail trade is divided into a number of genres which include building materials and garden supplies, general stores selling general merchandise, food, clothes, accessories, furniture, food and drink; auto dealers and service stations, and miscellaneous retail. Entries in the Dun and Bradstreet datafile (1989) total 2,571 establishments in the business of retail trade. There has been very little change in the retail trade industry in Fulton and Knox counties between 1977 and 1987 (Figure IX-15). Most of the retail establishments are located in the metropolitan area of Peoria where retail trade earnings ranked 3rd in 1977 and 1987.

In Fulton County there are approximately 325 retail facilities, 469 in Knox County, and 1,777 in Peoria County. Approximately 24 percent are eating and drinking establishments, 13 percent are automotive dealers and service stations, and 9 percent are food stores and furniture stores.

Of the 116 businesses in the nine township units, contained in the Dun and Bradstreet files, the three largest categories represented are eating and drinking establishments, auto dealers and service stations, and food stores.

RETAIL TRADE



Source: Dept. Commerce & Community Affs.
Note: Full/part time staff by place of work.

FIGURE IX-15

Finance/Insurance/Real Estate

The finance, insurance and real estate industry in Fulton and Knox counties has maintained uniform employment throughout the decade 1977-1987. This industry in Peoria County has followed similar trends as in other industries where levels were higher in the late 1970's, declining in 1980 and continuing until 1983, and then rising in subsequent years (Figure IX-16). Table IX-22 illustrates the rate of growth as projected from 1987-2000.

TABLE IX-22

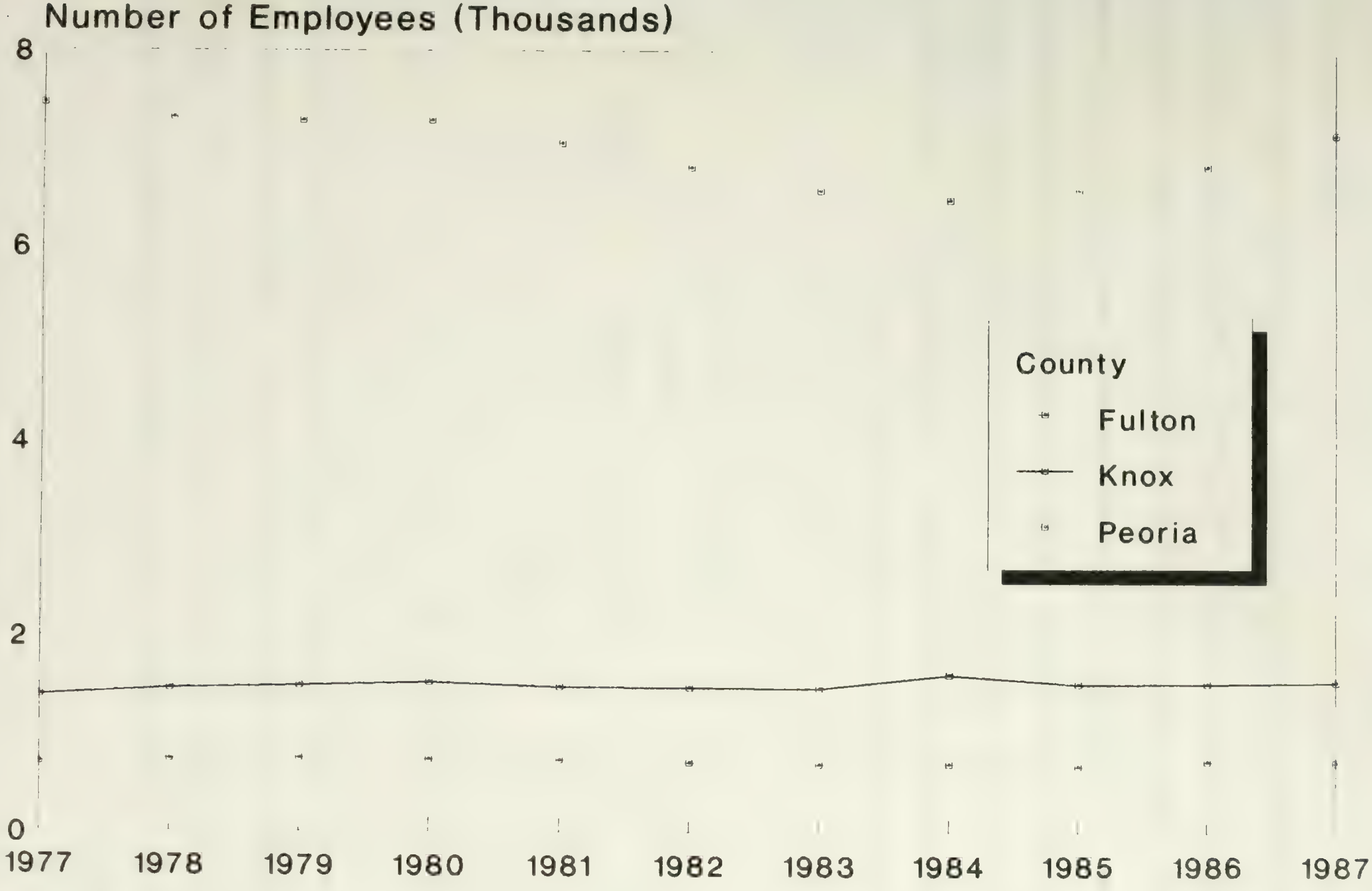
ECONOMIC FORECAST - FINANCE/INSURANCE/REAL ESTATE

County	%Growth 1987-1991	%Growth 1991-1995	%Growth 1995-2000
Fulton	-0.5	3.2	2.1
Knox	-0.2	1.6	1.2
Peoria	1.9	1.2	0.8

Source: State Economic Service. 1989.

There are 840 establishments in the finance, insurance and real estate industry in the tri-county region. Eighty-one are in Fulton County, 129 are located in Knox County, and 630 can be found in Peoria County. Approximately 39 percent are involved in insurance of various kinds, and 37 percent real estate enterprises (Dun and Bradstreet Market Identifiers 1989). Within the nine township unit there are 26 businesses, most of which are banks and insurance companies.

FINANCE/INSURANCE/REAL ESTATE



Source: Dept. Commerce & Community Affs.
Note: Full/part time staff by
place of work.

FIGURE IX-16

Services

The service industry is all encompassing. It is comprised of hotels and lodging, personal, business, auto repair and parking, motion pictures, amusement and recreation, health, legal, educational, social, engineering, private household, and museums. As noted previously, the service industry accounts for a large segment of the economy for each county. Clearly, the service industry has been on the upswing from 1977 through 1987. This is especially salient in Peoria County where figures increased markedly from 1984 through 1987 (Figure IX-17). Table IX-23 shows growth projections from 1987-2000 for the service industry.

TABLE IX-23

ECONOMIC FORECAST - SERVICES

County	%Growth 1987-1991	1991-1995	1995-2000
Fulton	1.6	2.3	1.4
Knox	1.9	0.7	0.5
Peoria	2.8	1.8	1.3

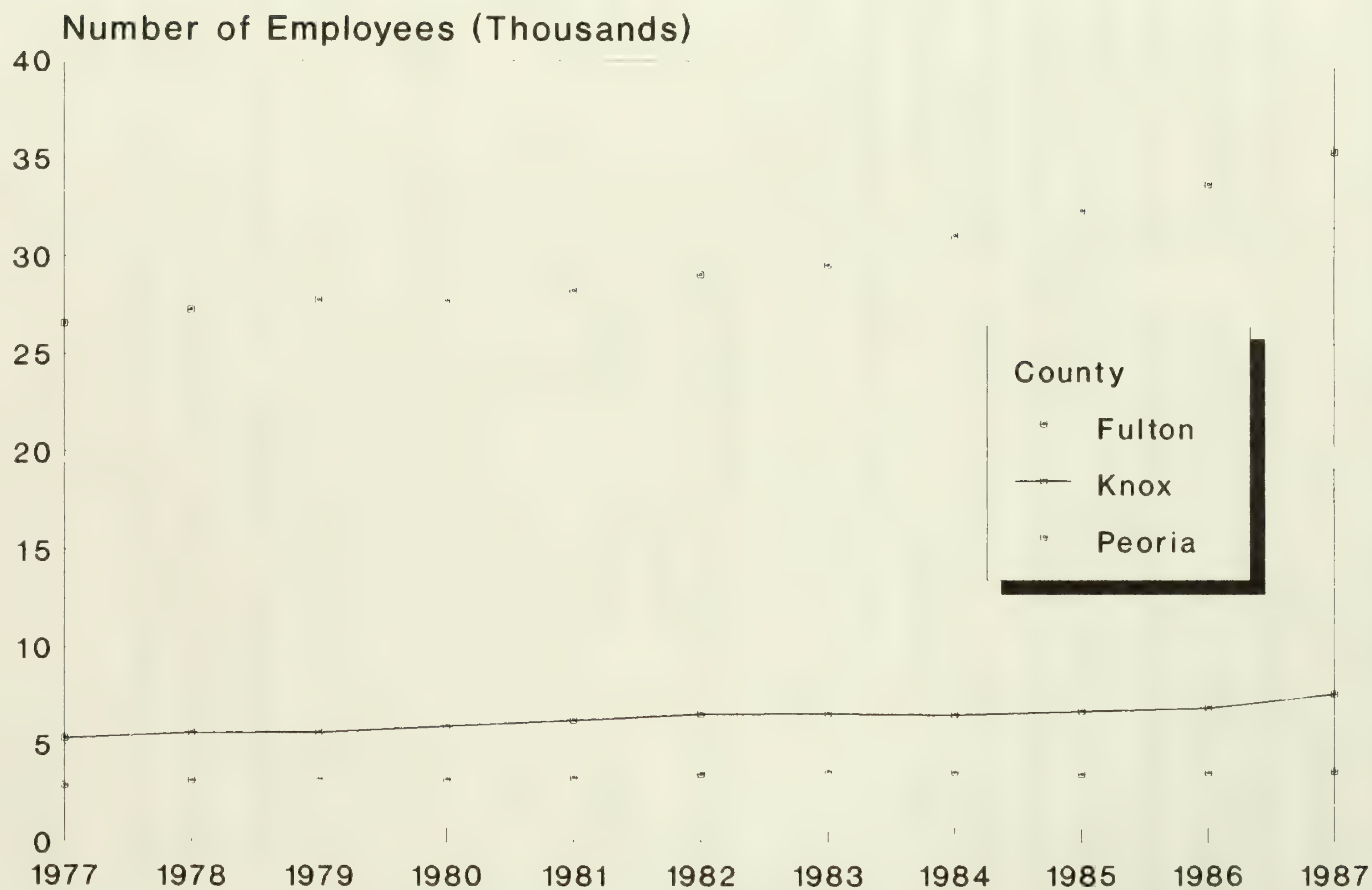
Source: State Economic Service. 1989.

There are 3,184 service entities in the tri-county area: 328 located in Fulton County, 528 in Knox County, and 2,328 in Peoria County. Approximately one-third of these services are related to personal services and health care. Other areas largely represented include business services, membership organizations and educational services.

Of the 99 service related establishments in the nine township unit, the majority are personal services most of which are beauty salons and barber shops; and educational

services which include schools and libraries. The service sector will be addressed further in Section IXC.

SERVICE



Source: Dept. Commerce & Community Affs.
Note: Full/part time staff by
place of work.

FIGURE IX-17

Government

Government is divided into Federal military and civilian, and state and local. This facet of the economy employs a large sector of the regional population, with concentrations in the state and local area. Figure IX-18 depicts a decline in the number of employees in government from 1977-1987. This pattern is evident in Peoria County, as employment levels declined from 1977-1982 and then leveled off until 1987. Table IX-24 illustrates government projections from 1987 through 2000 for the tri-county area.

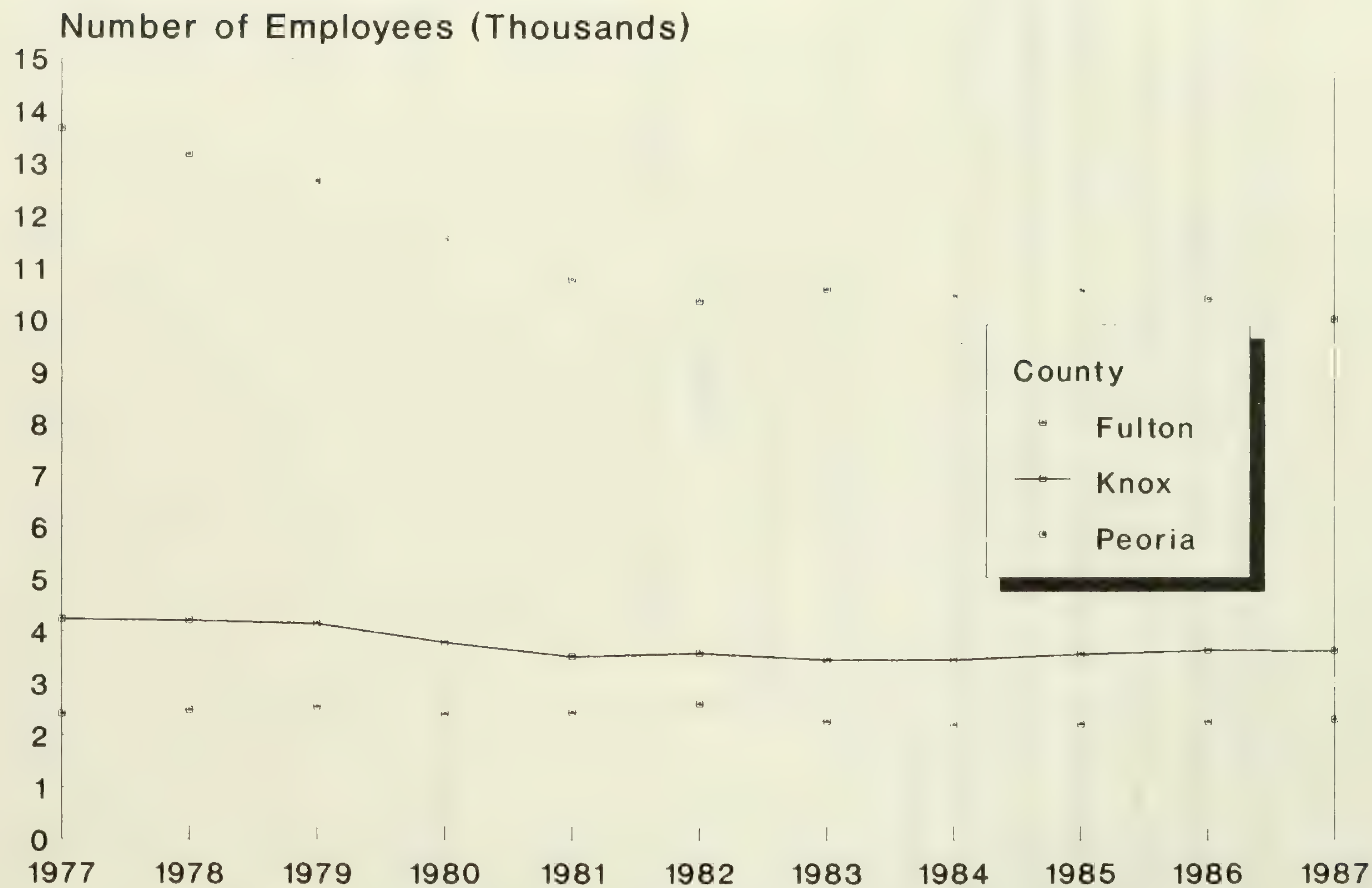
TABLE IX-24

ECONOMIC FORECAST - GOVERNMENT

	%Growth		
County	1987-1991	1991-1995	1995-2000
Fulton	-1.9	1.2	1.4
Knox	-1.6	-0.3	0.5
Peoria	0.5	1.0	1.5

Source: State Economic Service. 1989.

GOVERNMENT



Source: Dept. Commerce & Community Affs.
Note: Full/part time staff by
place of work.

FIGURE IX-18

C. SERVICE INFRASTRUCTURE

Transportation

Due to the regional extent of transportation facilities, a study area that encompasses Fulton, Knox, and Peoria counties will be used to analyze transportation features adjacent to the petition area. Nearly all major transportation modes are available in the study area including air, rail and highway. (Map 72)

The statewide system of coal distribution relies on several types of transportation to deliver coal to Illinois markets. Railroads and rail-barge combinations serve as the primary means of transporting coal to customers located in Illinois. In 1988, these two modes carried over 85 percent of the State's coal traffic. Conveyors used with barges accounted for 6 percent of the coal movement, and the remaining 9 percent of coal shipped within Illinois was transported by truck. Trucks are primarily used for short-haul movement of coal between mines and utilities.

Compared to the relatively small contribution of trucking to statewide coal distribution, all coal movement in the study area is dependent upon tractor-trailer combination units. Therefore, this section will focus on highway resources only, including road types, physical conditions, traffic volume, and safety.

The highway system in the tri-county study area is made up of about 4,200 miles of state, county, township, and municipal roads. Each county contains an equal amount of road mileage (1,400 miles), but the distribution by road type within each county is not nearly as uniform.

The level of urbanization in each county is reflected in an analysis of mileage by category. As part of a standard metropolitan statistical area (SMSA), Peoria County serves as a regional center for goods and services. The distribution of road types found in Peoria County is indicative of this regional role with over 40 percent classified as state and county, 50 percent township, and the remaining 10 percent considered municipal. The counties of Knox and Fulton reveal a different ratio of road types as a result of their more rural character. Only 30 percent of their roads are classified as state and county; the proportion of township roads increases to 65 percent; and municipal roads make up less than 4 percent of the total mileage in these counties.

The surface type of roads in each county is also a function of urbanization. Almost 75 percent of the roads in Peoria County are paved, 50 percent of the roads are paved in Knox County, and in the absence of a major urban center, only 30 percent of the roads in Fulton County are paved. Considering the entire study area, virtually all of the Federal, state, and municipal roads are paved. Almost all county roads are paved but only 25 percent of township roads are paved, with most of the paved mileage found in Peoria County.

The physical condition of roads is affected by such factors as traffic volume, vehicle type, vehicle weight, soil base and weather conditions. The pattern and volume of total traffic flow on state highways in the study area is influenced by the cities of Galesburg and Peoria (Map 73). Between 1983 and 1988, Knox and Peoria County's total volume has increased over 11 percent, but Fulton County's volume increased only marginally.

The type of roads carrying this increased volume was different in each county. Only state highways showed an increase in Fulton County, the volume on county, township, and municipal roads declined. Knox County experienced a growth in traffic volume for all categories, but especially state and township roads which increased about 15 percent each. Peoria County's traffic volume increased significantly on all road types and due to Peoria's urban nature, volume on municipal roads recorded the largest increase in the study area. Increased traffic volume contributes to the rate of pavement deterioration but in many cases maintenance funds have not increased commensurately.

Volume of traffic and vehicle axle loads are major determinants of pavement deterioration. The legal gross weight of vehicles authorized to use each road type varies according to the road's intended use. Truck weight limits range from 18,000 pounds for single axle trucks on most township roads to 80,000 pounds for five axle trucks on state and federal highways. Research conducted by the Illinois Department of Transportation (IDOT) reveals that pavement damage may occur on roads that experience a high volume of heavy truck traffic. For example, when comparing an 80,000 pound truck to an automobile, research indicates that the truck will do approximately 10,000 times more damage to the pavement than the car (IDOT 1988). Naturally, highway users and engineers are concerned about the structural integrity of bridges and pavements that carry a high volume of heavy truck traffic.

To analyze the flow of truck traffic, the Illinois Department of Transportation (IDOT) periodically creates a Daily Multiple-Unit Traffic map which includes tractor-trailer combinations. The 1988 version of this map was used to estimate the movement of truck traffic in the study area (Map 74). As expected, the general flow of truck traffic

mirrors total traffic volume and is largely determined by the cities of Galesburg and Peoria.

To estimate coal-specific traffic movement attributable to the Rapatee Mine's preparation plant, operational information was obtained from Mid State Coal Company. All coal removed from the present mining site and any coal which might be mined from the area addressed in the Land's Unsuitable petition would be transported to the Rapatee Mine's preparation plant for processing. The coal is hauled to the plant with Mid State owned and operated off-road haulage trucks on Mid State haulage roads built specifically to accommodate this equipment. These private haulage roads do cross public roads at times, however, all crossings sites are approved before hand with appropriate governing officials and bonds posted where required. On a typical day, 30 to 40 loads of coal would cross a public road at any one designated crossing point enroute to the preparation plant. Haulage of coal is generally done during the week. Occasionally coal is hauled from the pit on Saturday, but never on a Sunday or a holiday.

Approximately 550,000 tons of coal per year are shipped to Mid State's customers by commercial truck. All commercial trucks hauling coal to Mid State customers are loaded at the mine's preparation plant which is located west of the Village of Middlegrove on Route 116. Typical commercial trucks hauling from the Rapatee Mine carry 45,000 pounds (22 1/2 tons) of coal per load. The gross weight of a typical commercial truck hauling coal from the Rapatee Mine is 72,000 pounds. These trucks have five axles.

Roads used to haul coal to market are selected based on the location of the mine, location of customers, and weight limits of accessible roads. No alterations to the

existing transportation network are anticipated as a result of present or future mining activities. Current coal hauling traffic attributable to the Rapatee Mine's preparation plant reflects these considerations (Map 75). Weekend deliveries account for 7.4 percent of the total loads leaving the mine annually. All weekend deliveries are to customers located south and east of the processing plant. There is a slight seasonal fluctuation in the volume shipped, with less coal shipped in the warmer months.

Based on information provided by Mid State Coal Company, approximately 75-80 loads of coal leave the Rapatee Mine processing plant on the average working day. All hauling is contracted out to six trucking firms. Two trucking firms use Knox County Route #22 as a means of getting to the Rapatee Mine office to haul coal. This amounts to 12 trucks a day traveling Route #22 between 5:30 and 7:00 am, Monday through Friday, but only using this route to return home on Friday. On Saturday and Sunday, seven trucks use this route in the morning and some use this route to return home in the evening. The remainder of loads are hauled by trucks from the other four trucking firms which are located in the Peoria area. These trucks take a variety of routes to Farmington, but all end up taking Route 116 from Farmington to the plant, Monday through Saturday.

In addition to large haul trucks that cross Route 116 carrying coal from the pit, and commercial coal delivery trucks that travel on public roads, employees and suppliers generate vehicular traffic. Mid State Coal Company employs 79 people and these people travel in personal cars on public roads to the processing plant. Deliveries by suppliers are made to the mine on almost a daily basis during the week, but few if any are made on weekends.

Total traffic volume and the type of traffic combine to alter the road conditions and safety of the transportation system. Current road condition ratings for highway segments adjacent to the petition area were provided by the Illinois Department of Transportation (IDOT), Office of Planning and Programming. These road segments have slight to moderate surface defects and average maintenance requirements. Road surface conditions range from tolerable to good, based on IDOT's pavement quality rating system.

Ratings are only calculated for state highways, however, specific allegations involve Knox County Highway #22. Information on this road segment was obtained from the Knox County Highway Department. This roadway has an oil and chip (seal coat) surface and the average daily traffic volume has increased 18 percent since 1980, to the current level of about 400 vehicles per day. According to the Knox County Superintendent of Highways, the roadway is presently adequate to meet the needs of the area served and should continue to meet those needs but is not adequate to support either higher volumes of traffic or increased axle loads. In addition, the vertical alignment of this roadway and the existing shoulder width is not suitable for increased traffic volumes. At the present time there are no plans to reconstruct, resurface or provide any repair or maintenance to this roadway other than routine chip seal every four to five years. Based on the current capital improvements schedule, it will probably be 35 to 40 years before any significant work will be performed on this segment of road.

A variety of factors influence the safety of a road system and several measures of safety have been used including lane width, shoulder width, volume/capacity ratios or surface conditions. An examination of accident data is considered a more direct assessment of road safety.

Accident data for roads adjacent to the petition area were obtained from the Illinois Department of Transportation, Traffic Statistics Unit. Collision data are available from the Traffic Statistics Unit for 1982 to 1988. The accident patterns for selected roads and representative years are illustrated in Map 76. An examination of accidents relative to traffic volumes recorded by road segment gives a clear indication of problem areas.

To express road safety in this manner, a ratio was formed between the average yearly volume of traffic for a road segment and the average yearly number of accidents on that road segment, based on data for 1982 to 1988. The resultant accident/volume ratio is interpreted as the number of vehicles that must travel a road before an accident occurs. For instance, a road segment with an accident/volume ratio of 1:80,000 would, on average, experience an accident for every 80,000 vehicles traveling that road segment. Comparatively, a road with a higher ratio is safer than a road with a lower ratio because accidents would occur less often.

In keeping with the intent of this report, the accident/volume ratios of roads currently hauling coal and Knox County Highway #22 will be compared. An allegation maintains that if the petition area is opened to surface mining the level of safety on Knox County Highway #22 will decrease. To determine if that will happen the current level of safety must be determined. Adjacent to the Rapatee processing plant, State Highway 116 runs west from the intersection of 78 and 116, through Farmington to the intersection of 97 and 116 and carries the highest percentage of truck traffic. Truck traffic accounts for 12 percent of the total traffic on this roadway and carries the highest volume of coal-hauling traffic. This road segment also has an accident/volume ratio of 1:56,000, the lowest of the roads considered. All other

roads adjacent to the petition area carry an equal proportion of truck traffic, approximately five percent. State Highway 97, from the intersection of 97 and 116, to the intersection of 97 and 8 is the other segment that carries a high volume of coal-hauling traffic and has an accident ratio of 1:78,000. It is important to note that these two roads carry a relatively high volume of total traffic and truck traffic, of which only a portion are coal-hauling trucks. Knox County Highway #22, from the intersection of State Highway 8 and County Road #22 to the intersection of State Highway 116 and County Road #22, shows an average proportion of truck traffic (5%), relatively few coal trucks, and an accident/volume ratio of 1:140,000.

In relative terms, Knox County Highway #22 is roughly two-three times "safer" than the two state highways currently carrying coal delivery traffic. It is tempting to infer that coal-hauling trucks lower the safety level on roads they travel. However, an examination of the type of accidents indicate that the likelihood of having an accident with a semi-truck is about the same on all road segments. On all roads adjacent to the petition area, 10 percent of the accidents that occurred between 1982-1988 involved tractor-trailers, whether the road segment carried coal delivery traffic or not. It appears that the total volume of traffic of all types is a greater determinant of road safety than the proportion of truck traffic. In particular, even though some road segments carried a drastically higher proportion of coal truck traffic than other roads, the likelihood of a vehicle being involved in an accident with a truck is no greater.

Other Services

Schools

There are a total of 28 school districts in the tri-county region either in whole or in part, some of which crosscut county boundaries (Map 77). Of these districts, 22 have experienced a decline in enrollment over the last four years. In 1986 the total enrollment for the region was approximately 47,658 pupils: in 1989 there were 46,299 students. The largest school district in the region is the Peoria School District with a 1989 enrollment of 16,552. Galesburg is the next largest school district in terms of enrollment with 5,596 pupils, followed by the Canton School District with an enrollment of 2,903.

Like many student populations in the state, the tri-county student body is declining. The decrease has resulted from a decline in the population of school age children as illustrated in the under 18 age group breakdown in Section IXA. Table IX-25 displays the five largest school districts in Knox County, enrollment from 1986-1989, and percent change.

TABLE IX-25

KNOX COUNTY SCHOOL DISTRICTS

District Name	1986	1987	%Chg	1988	%Chg	1989	%Chg
Galesburg	5596	5533	-1.1	5475	-1.1	5338	-2.5
Farmington	1734	1697	-2.1	1676	-1.3	1672	-0.2
Knoxville	1464	1467	0.2	1422	-3.1	1404	-1.3
Abingdon	1159	1145	-1.2	1107	-3.3	1073	-3.1
Rowva	920	924	0.4	918	-0.7	925	0.8

Source: Illinois State Board of Education
Note: Enrollment figures are based on weighted average daily attendance.

Health Care

There are over 500 hundred health care facilities in the tri-county region comprising offices and clinics represented by various types of doctors, nursing and personal care facilities, laboratories, specialty outpatient services and hospitals (Dun and Bradstreet Market Identifiers 1989). In Fulton County there are 46 recorded facilities; in Knox County there are 66 facilities; and in Peoria there are 407. Graham Hospital located in Canton is the largest general medical and surgical hospital in Fulton County which is equipped with approximately 144 beds. In Knox County there are three hospitals: Galesburg Cottage with 286 beds and St. Mary's with 176 beds, both in Galesburg; and Community Memorial in Monmouth with 138 beds. Peoria County has a number of hospitals with its limits. The largest includes St. Francis which has 728 beds, Proctor Hospital containing 305 beds, and Methodist Medical Center founded in 1898 containing 521 beds. One of the oldest hospitals in the area is Sisters of the Third Order founded in 1875 (Department of Public Health, statistical data on health care facilities, and Dun and Bradstreet Market Identifiers 1989).

Fire Protection

Fulton County has 14 fire districts that are under the direction of the Fulton County Emergency Services Disaster Agency, and in association with the Spoon River Valley Fire Association. The county itself has approximately 140 fire fighters, and in 1983 had approximately 55 fire trucks at its disposal. The only paid fire district in Fulton County is Canton, with 16 fire fighters, 14 of which are trained Emergency Medical Technicians. The Canton fire department has 5 trucks at its disposal. Of the 13 other fire districts, Lewistown and Astoria are the two largest districts. Over the last

decade, there has been a decrease in overall staff due to a decrease in the tax revenue (Bob DeRenzy,Canton Fire Dept. Chief, personal communication March 1, 1990).

Knox County has 13 fire districts, 12 of which are volunteer status. Galesburg is the only paid fire district in the County with approximately 50 fire fighters, and 5 trucks. The second largest fire district is Knoxville, the third is Abingdon, and some other larger ones are Wataga, Oneida and Henderson (Barbara Foster, Galesburg Fire Station, personal communication, March 1, 1990).

Peoria County has 14 fire districts, the City of Peoria having the only paid fire district. As of 1989, the Peoria Fire Department employed 184 fire fighters, 2 of which are also paramedics, and 170 of which are Emergency Medical Technicians. As of 1989 there were approximately 27 fire fighting vehicles. The second largest district in terms of population is Chillicothe, and in terms of area, the district of Brimfield (Vicky Turner, Peoria County Emergency Services and Disaster Agency, personal communication, March 1, 1990).

Police Protection

Fulton County is served by a County Sheriff's Department and many local police departments. The communities of Canton, Farmington, and Lewiston have full time departments; Astoria, Avon, Cuba, Fairview, London Mills, Vermont, St. David, and Norris have part time departments. The Canton Police Department has a staff of 20 commissioned and 7 noncommissioned officers with a fleet of nine police vehicles. The county has a road staff of 15 which includes deputies and sargents. A minimum security prison, Illinois River Valley Correctional Center, is located west of Canton

and is a 750 capacity facility (Bob Sheets, Fulton County Sheriff's Office, personal communication, March 1, 1990).

Knox County is served by a County Sheriff's Department and several local police departments. There are approximately 43 people in the County Sheriff's Office, approximately 16 are patrol officers. The communities of Galesburg, Abingdon and Knoxville have full time police departments, and Wataga, Oneida, Altona, Williamsfield, Maquon and Yates City are part time departments. Presently in Galesburg there are 48 sworn officers and 18 vehicles. There are several correctional institutions in Knox County: Henry Hill Prison in Galesburg, originally a 900 bed unit, Knox County Jail which can detain 42 people, and Mary Davis Home, a juvenile detention center (Captain DeForest, County Sheriff's Department, personal communication, March 1, 1990).

Peoria County is served by a County Sheriff's Department and many local police departments. There are five full time departments which include the City of Peoria, Chillicothe, Peoria Heights and Bartonville. The part time departments include the communities of Glasford, Elmwood and Norwood. The County Sheriff's Office employs approximately 160 people; 58 are officers assigned to police duty, and 73 to corrections. The City of Peoria's Police Department has approximately 185 employees. There are three correctional facilities in the County. Hannah City State facility is a minimum security operation. There is a state work release facility in downtown Peoria, and a youth farm for juveniles approximately two miles from Bellevue (Chief Deputy George Andrews, County Sheriff's Department, personal communications, March 1, 1990).

Utilities

The tri-county region is serviced by Central Illinois Public Service Company (CIPS), Central Illinois Light Company (CILCO), and Illinois Power (IP) for both natural gas and electricity (MAP 78 and 79). Fulton County is serviced by CIPS, although CILCO has an electric utility plant within the county, power generated there is transported to Peoria. Knox County is serviced by IP and CILCO, and Peoria County is serviced by CILCO. The electric rates for residential use in the three counties are below the state average of cents per kilowatt hour. Natural gas prices for residential use are above the state average of cents per therm except for CIPS customers (Table IX-26).

TABLE IX-26

TRI-COUNTY UTILITY RATES

Electric 1988

	Cents/Kilowatt Hour		
	Residential	Industry	Commercial
CILCO	7.6	4.2	6.8
CIPS	8.0	4.8	7.3
IP	8.5	4.2	7.3
Avg. State Rate	9.2	4.8	7.6

Natural Gas 1988

	Cents Per Therm			
	Residential		Industry Plus Commercial	
	with Space Heat	without Space Heat	with Space Heat	without Space Heat
CILCO	73.9	49.1	47.3	50.4
CIPS	68.0	49.9	48.6	48.3
IP	86.2	56.3	37.5	46.5
Avg. State Rate	68.9	43.2	37.1	39.1

Source: Illinois Commerce Commission. 1988.

The demand in generating capacity for CIPS customers in the area is not expected to increase. IP will be building peaking plants (plants that are designed to generated power during the peak usage periods only), within the next 12 years. CILCO is expecting to build a peaking plant in 1994 to accommodate increases in demand.

Both surface and subsurface sources of water are utilized in the tri-county region. In Fulton County several communities including Canton and Vermont utilize surface waters. All water used in Knox County is from groundwater sources. Galesburg receives its water from a well field near Oquaka along the Mississippi River, although they have a three well reserve field in town. The city of Peoria receives water from both surface and subsurface sources. About half of their water comes from the Illinois River and the other half from wells.

Water quality can be a concern for both users of surface and groundwater. In the groundwater, a high mineralized content is found in some wells. Most public water supplies in the area have some chlorine treatment. In Galesburg, an additional treatment takes place to remove iron (Rich Gerard, IEPA, personal communication, March 8, 1990).

Most communities, as well as, several industries, utilities, public parks and rural schools provide waste water treatment. All public facilities provide secondary treatment as mandated by law. Private systems are utilized in the rural areas (James Kammueller, IEPA, personal communication, March 8, 1990).

There are four active landfills in the tri-county area. Two facilities are located in Peoria County, and one each in Knox and Fulton counties. Fulton County exported over half of the waste it generated, while Peoria County imported over half of the waste disposed of in its landfills. Knox County did not export any waste during 1987 but imported a small amount, less than two percent of the waste handled in the

County. The facility in Knox County is expected to reach its reported capacity in less than two years.

D. LAND USE AND LAND USE PLANS

This section will be divided into two parts. First regional plans or statewide plans mentioned in the petition will be discussed. A brief description of the plans will be included in this chapter. How the plans deal with the issues of the petition will be detailed in Chapter XI. Second, specific land use plans for the petition area will be discussed. This will include an analysis of existing land uses as well as a description of projected land uses for the area. The potential impacts of mining on these plans will be discussed in Chapter XI.

Several regional land use plans were specified in the petition:

- o The Knox County Soil Erosion and Sediment Control Plan,
- o Illinois Environmental Protection Agency Water Quality Management Plan,
- o Illinois Groundwater Protection Act.

The Western Illinois Regional Council (WIRC) is the regional council of elected officials that contains Knox County in its area of jurisdiction. The Council provides technical assistance and help with grant applications when requested by one of the counties or municipalities within its boundaries. Six counties are included in the service region of WIRC, they include Henderson, Warren, Knox, Hancock, McDonough and Fulton (Pam Miner, WIRC, personal communication, November 17, 1989).

Knox County is not an active member of the WIRC and has not been for a long time. Although Knox County is not a member of WIRC some of the communities in the county have requested assistance from WIRC. No specific work or plans for Knox County or the petition area have been prepared by WIRC.

Regional Land Use Plans

Knox County Soil Erosion and Sediment Control Plan

Knox County has not prepared its own Soil Erosion and Sediment Control Plan, but the Knox County Soil and Water Conservation District (SWCD) has prepared a plan, called the Knox County SWCD Soil Erosion and Sediment Control Program and Standards. The District has in its "Purpose of Formation" undertaken a very broad approach to protecting the rich soil of the county as well as the natural environments that exist because of it and the value of the tax base that is based upon this resource. The "Purpose of Formation" states;

> "The District is responsible for the broad overall soil and water conservation program as set forth in the Illinois Soil and Water Conservation Districts Act. It provides for the conservation of soil and water resources of the District, for the control and prevention of soil erosion, flood water and sediment damage. The District Act also charges the District with responsibility for preservation of wildlife and forests and for the protection of the tax base and the protection and promotion of the health, safety and general welfare of the people." (Knox County Soil and Water Conservation District, 1981).

The role of educating the public was also discussed for the District. Most importantly the need to inform people of what is prime agricultural land. The District feels that once the public understands what it is and why it is important they can make informed decisions when a nonagricultural use is proposed on prime farmland. If a

change in land use is desired then an informed decision can be made as to what the best use would be.

IEPA Illinois Water Quality Management Plan

The Illinois Water Quality Management Plan is the coordinated effort of the IEPA and three regional planning agencies to establish policies and programs to address water quality issues within the State (IEPA Division of Water Pollution Control 1985). The three regional planning commissions that contributed to this report are; Northern Illinois Planning Commission (NIPC) near Chicago, Southern Illinois Metropolitan and Regional Planning Commission (SIMAPC) near St. Louis, and the Greater Egypt Regional Planning and Development Commission (GERPDC) in southern Illinois. The remaining 83 counties not covered by one of the three regional planning commissions were represented by the IEPA in the development of the Plan. This includes Knox and all of its surrounding counties.

The Plan was last updated in 1985 and addresses both point and nonpoint water pollution sources. Many topics are addressed under the nonpoint source heading. Hydrographic modification was discussed mainly through the impacts of channelization and little mention of the impacts of mining. The only reference was to say that "surface mine abandonment and reclamation and reclamation plans should establish procedures to assure that drainage patterns are restored after hydrographic modifications are performed." Additional specific references to mining are detailed in Chapter XI.

Illinois Groundwater Protection Act

The Illinois Groundwater Protection Act became effective in September of 1987 and was designed to address the continuing threats to this valuable resource. Most environmental legislation in the state is enforceable only after problems have been detected, but this legislation is designed to prevent groundwater contamination from taking place. Almost 50 percent of the population is dependent upon groundwater as a source of drinking water including about 74 percent of community water systems and about 400,000 private wells. In addition many industries throughout the state are dependent on this resource. To ensure that an adequate quantity of groundwater of sufficient quality to meet the public needs exists, the state has developed as its policy, "to restore, protect, and enhance the groundwater of the state, as a natural and public resource" (P. A. 85-0863).

The Act provides for the creation of setback zones around private and community water wells as a means of reducing the potential for contamination. New activities within these setback zones are clearly defined and carefully controlled. Standardized setbacks of 200 and 400 feet were established around wells and potential sources of contaminants. Identified recharge areas for groundwater are also defined and new activities within these areas are controlled. Provisions were also put into place to regulate the development of new wells. The siting of new wells is controlled to ensure that they are not located near known potential routes or sources of contamination.

Local Land Use

This section will be divided into two parts. The first will describe the current land use and the second will describe proposed land use plans. A nine township area centered around the petition area was chosen as the study area for this section. A three county region was felt to include too much area and the one township area would be too small to give a representation of the area.

Current Land Use

Current land use maps do not exist for all nine of the rural townships so zoning maps were used as an indicator of current land use. Except for areas designated as conservation that are presently used for other purposes, primarily agriculture, the zoning maps provide a good general representation of land uses in the area. A breakdown of zoning classifications for most cities and towns was included on the township maps provided by each county. Several municipalities control their own zoning and their detailed zoning was not represented on the township maps. These cities included Maquon in Knox County, Farmington and Fairview in Fulton County and Brimfield in Peoria County.

A composite zoning map was prepared for the nine township area and is displayed on Map 80. It should be noted that since portions of three different counties make up this area a generalized key was produced since the three county keys used different nomenclature. For example the 'rural residential' category used on the Knox County Zoning map did not match the 'county home' category used on the Peoria County Zoning map. Also Knox County had only one residential category while Fulton and Peoria Counties each had two. To eliminate these discrepancies all residential areas

were simply designated residential, regardless of whether they fell in rural areas or within cities and towns. Similar generalizing was done for other zoning categories as necessary. As mentioned four cities controlled their own zoning, they are designated on the map as municipally zoned.

The petition area itself is zoned entirely farming/agricultural and conservation. According to the Zoning Resolution for Knox County, Illinois (Ammended August 17, 1988) the extraction of minerals, including sand, gravel and coal, is a conditional use for both farming and conservation districts with the approval of the Knox County Board. But county zoning designations can not prevent the use of land for mining.

When seeking a permit to mine in Knox County a mining company must file with Knox County the same information and plans that they are required to submit to the Illinois Department of Mines and Minerals. Even though Knox County has no authority to reject the application on the basis of zoning, they are invited to comment on the application as is the general public.

Approximately 83 percent of the land in the nine township area is designated agriculture on their respective zoning maps. Another 14 percent is zoned conservation. Only three percent of the area has zoning designations other than these two and most of these designations are in or adjacent to cities or towns. The closest nonagricultural or nonconservation zoning designations to the petition site are in Douglas and Yates City to the north of the petition site, Elmwood to the northeast, and Farmington to the south. None of these communities have any zoned areas within the petition area although a portion of Yates City which is zoned residential is on the border of the petition site. A detailed land cover analysis of the area can be found in Chapter VII of this report.

Land Use Plans

The same nine township area was used to look at the planned land use for the area. Planned land use maps were recieved from all three counties. The Comprehensive Plan, Galesburg and Knox County, Illinois was prepared in 1967, the Fulton County Land Use Plan was prepared in 1968 and the Peoria County plan is part of a plan prepared by the Tri-County Regional Planning Commission in 1972. Given the rural nature of the area in question and the slow development rate, Bob Masterson, Zoning Administrator for the Knox County Zoning Department felt that the plan still accurately represented the desires of the County (personal communication, Nov. 13, 1989).

A composite map of the planned land use for the area is shown on Map 81. As with the zoning maps most of the area is designated agricultural (71%) or conservation (20%). Much of the conservation area is along waterways, intending to preserve the remaining riparian habitat. Fulton County is the only county with a surface mining category. Thirty-one percent of the area in the two townships in Fulton County are included in this category. As in the current land use map, the developed land uses are again concentrated around existing cities or towns, with little development outside these areas.

Since the entire petition area falls within Salem Township specific attention was given to the planned land use for this area. The Comprehensive Plan was prepared for Galesburg and all of Knox County. The majority of the document pertains to Galesgurg and most of the planned development for the county is/was intended to take place in this area (Bartholomew and Associates 1967).

The plan puts forth three fundamental objectives for the county;

- o Protection of agriculture as the most important land use,
- o Provision of major recreational facilities to make the community a better place in which to live,
- o Allocation of industrial sites properly located and ample in area.

Additionally a large emphasis was put on the designation of areas in the county as recreation and conservation areas. Much of the area designated recreation and conservation is located around two proposed lakes in the county and along the Spoon River corridor. Neither of the proposed lakes fall in the petition area. A total of 17 percent of the county is classified in this category. It was suggested in the plan that eventually some of the areas could become publically owned, possibly in a county Forest Preserve District, although most areas are expected to remain in private ownership with uses carefully controlled by zoning regulations.

CHAPTER X

SUPPLY & DEMAND FOR COAL

A. INTRODUCTION

This chapter presents the analysis of the potential economic and social impacts of locating a surface mine in Salem Township (Knox County, Illinois). In order to adequately analyze impacts, several factors must be examined. Those include estimations of (1) the amount of coal reserves and marketable coal, (2) the demand for coal, (3) coal prices and total market value, and (4) the potential employment, fiscal and monetary effects of a Salem Township mine.

Estimates of the amount of coal underlying the entire Salem Township petition area will be presented and considered within the context of other surface-minable coal reserves with high development potential. The local, state, regional, national and world demand for coal will be discussed; and, in some cases, forecasts of future coal demand will be made. Also, the market for Illinois coal production will be presented in order to illustrate supply fluctuations.

Relevant coal prices will be used to determine the market value of the Salem Township coal. Estimates of the market value of crops grown on potentially affected farm lands also will be made. Annual market values will be utilized in determining estimates of the potential fiscal impact on Knox County and State of Illinois sales tax revenues. In addition, the impact of the proposed Salem Township surface mining operation on the property tax revenue of Knox County will be analyzed. The potential for farm acreage leaving and/or being added to the property tax rolls as land holdings may be exchanged between Mid State Coal Company (Mid State) and other relevant owners will be taken into account. Finally, the primary and secondary employment, fiscal and monetary impacts on the relevant regional and the entire Illinois economy will be outlined in terms of the separate impact of a

surface-mining operation as well as the net impact of the addition of the economic value of a mine and the maximum possible loss of the economic value of the potentially impacted farm land.

B. SALEM TOWNSHIP COAL RESERVES

Using the same methodology as a study of surface-minable coal reserves and resources in Illinois (Treworgy, Bengal and Dingwell, 1978), the Illinois State Geological Survey Division (ISGS) of the Illinois Department of Energy and Natural Resources (ENR) has estimated that about 48.1 million (48,115,980) tons of coal reserves are located under the proposed Salem Township mining area. Approximately 34.4 million (34,352,280) tons are from the Springfield Coal Seam, while about 13.8 million (13,763,700) tons are from the Herrin Coal Seam. However, Mid State Coal Company (Mid State) estimates a total of roughly 37 million (36,840,000) tons, with 27 million (27,112,625) tons being Springfield and 10 million (9,727,375) tons being Herrin coal. Taking into account other relevant data regarding the probable on-site coal density as well as existing surface mining technology, the estimated amount of impurities imbedded in the coal and probable losses due to the cleaning and processing of the coal, the ISGS has determined that Mid State would realize approximately 33 million (33,225,583) tons of final marketable coal if the entire petition area is mined. About 24 million (24,279,178) tons would be Springfield coal and roughly 9 million (8,946,405) would be Herrin coal. Again, Mid State estimates about 29 million (29,472,000) tons of marketable coal with approximately 22 million (21,690,100) tons being Springfield coal and roughly 8 million (7,781,900) tons being Herrin coal. It should be noted that the ISGS and Mid State estimates of the quantities of coal reserves and marketable coal

differ. Mid State's estimates of markatable coal amount to about 1.0 to 3.7 million tons less than respective ISGS estimates.

TABLE X-1

MID STATE AND ISGS ESTIMATES OF SALEM TOWNSHIP COAL

	Mid State Estimates*		ISGS Estimates	
Coal Seam	Coal Reserves (in tons)	Marketable Coal (tons)	Coal Reserves (in tons)	Marketable Coal (tons)
Springfield	27,112,625	34,352,280	34,352,280	24,279,178
Herrin	9,727,375	13,763,700	13,763,700	8,946,405
TOTAL	36,840,000	48,115,980	48,115,980	33,225,583

* Sources: Meeting, January 31, 1990 and Mid State, 1990.

The discrepancies in marketable coal tonnage are approximately twelve percent. In addition, Mid State and the ISGS disagree slightly on the character of the dry coal itself. The Salem Township block (a contiguous area of coal) is within the Herrin Coal Member, with an average of 65 feet of relatively soft and unconsolidated overburden (loose geologic material covering the coal). Moreover, the Springfield Coal Member is present with an average of 120 feet of overburden. After cleaning, according to the ISGS, the sulfur content of the Springfield coal would be 3.09 percent with the Herrin coal being 3.19 percent (with a measurement error of $\pm.1$ percent). In addition, the Springfield coal has an average heating value of 12,580 British thermal units (Btu's) per pound (lb.), and the Herrin coal 12,708 Btu's/lb., for an overall average of 12,644 Btu's/lb. Mid State estimates the sulfur content of the Springfield coal to be about 3.0 percent and the Herrin coal to be about 2.9 percent. Also, according to Mid State, the heating value of the Springfield coal is about 12,575 Btu's/lb., and for the Herrin coal roughly 13,014 Btu's/lb.. The overall average heating value would be 12,795 Btu's/lb..

Since the same methodology was used for both reserve estimates, the ISGS 41.5 million tons estimate will be used for comparing the amount of Salem Township coal to ISGS estimates of other surface-minable coal reserves in the area. Estimates of the fiscal and monetary impact of the proposed Salem Township mine on sales tax revenues will be based upon the ISGS estimate of 33 million tons of marketable coal. However, similar computations reflecting the lower Mid State estimate of 29 million tons also will be reported.

C. OTHER SURFACE-MINABLE COAL RESERVES WITH HIGH DEVELOPMENT POTENTIAL

The main source of data in this section is the comprehensive study of reserves and resources of surface-minable coal in Illinois done by Treworgy, Bengal and Dingwell (1978). Unless otherwise noted, all data in this section are from that study and will be referenced by figure, table, and/or page number.

Previous ISGS studies reported that there were 20 billion tons of strippable coal resources in Illinois. Strippable resources is defined as all coal in seams 18 or more inches thick with not more than 150 feet of overburden (pp. 1 and 2). Surface-minable reserves is a much more narrowly defined subset of strippable resources. The criteria used to reduce the prior estimates of strippable resources to an estimate of surface-minable reserves were: (1) reliability of data, (2) overburden and coal thickness, (3) size of coal block and (4) proximity to man-made and natural obstacles (p. 2).

The authors defined and applied the four criteria in the following way. First, estimates of resources "farther than 4 miles from an outcrop [visibly exposed seam of coal], mine or drill-hole" were considered to be unreliable data and were excluded

from the estimate of reserves (p. 4). Second, in order to be included in the estimate of reserves, any given coal seam had to meet the thickness to overburden criteria outlined in Table X-2 (Table 2, p. 8). However, "exceptions were made for the Colchester Coal Member in western Illinois [including Knox and eight other counties that will be considered], where several large areas of coal are less than 30 inches thick and have 50 to 60 feet of overburden. Because much of the overburden in this area is soft and unconsolidated, the limit of maximum overburden was raised to 60 feet" (p. 6).

TABLE X-2

COAL SEAM THICKNESS TO MAXIMUM OVERBURDEN CRITERIA

Coal Thickness (inches)	Maximum Overburden (feet)	Thickness: Overburden Ratio
18-29	50*	33:1 - 20:1
30-47	75	30:1 - 19:1
48-71	100	15:1 - 17:1
>72	125	- 21:1

* Noted exception for western Illinois Colchester coal. For this case only, the maximum overburden was 60 feet.

Third, the coal had to be contained in a block of at least 6 million tons. Coal blocks are "contiguous areas of coal or noncontiguous but nearly adjacent areas that are not separated by obstructions such as rivers, towns or interstate highways" (p. 6). Fourth, coal was excluded from the estimate of reserves if the presence of major man-made or natural obstacles seriously impeded or made illegal its mining. Major obstacles included "densely populated areas, interstate highways, parks, reservoirs, lakes and

large cemeteries" situated over the coal (p. 4). The report added that "state and county highways, railroads, pipelines, high-voltage transmission lines and widely scattered buildings are hindrances to surface mining, but are not always barriers" (p. 4). Such features, as well as the presence of small creeks and streams or being adjacent to a populated area, did not exclude a block from the estimate of reserves. However, the detailed block-by-block data appendix (pp. 21-33) included notations indicating where these (minor) obstacles were present and their nature.

After applying these criteria, the authors concluded that, as of July 1975, Illinois had approximately 6 billion tons of surface-minable coal reserves "made up of 184 blocks of 6 million tons or more" (p. 1, Table 1, p. 5 and errata). Moreover, Fulton, Knox and Peoria along with Perry and St. Clair counties had the largest reserves in the state. Also, 25 percent of Illinois surface mined coal was produced in Fulton, Knox and Peoria counties in 1978 (p. 4). In 1989, those three counties produced 2.6 percent of total Illinois surface mined coal.

Another recent study equated surface-minable reserves with the "high development potential classification used [by Treworgy and Bargh 1982] for deep minable" coal. That is, "deposits similar to those currently being mined can be considered to have a high potential for development" (Illinois Department of Energy and Natural Resources 1982, pp. 34 and 42). This analysis will follow the same logic. All surface-minable coal reserves are defined as having a high development potential (could be economically and profitably mined).

For purposes of strict comparison, the Salem Township block (#133) is not included in the estimate of Illinois surface-minable reserves. The counties of Bureau, Fulton, Henry, Knox, McDonough, Peoria, Schuyler, Stark and Warren will be considered as

containing relevant (other than Salem Township, block #133) surface-minable coal reserves with high development potential. Salem Township is in Knox County, and five of the other eight counties border Knox. All surface-minable coal reserve blocks in this nine-county region (Bureau, Fulton, Henry, Knox, McDonough, Peoria, Schuyler, Stark and Warren) lie within 60 miles of Salem Township (pp. 36, 39 and 40). Maps 8 and 10 illustrate this. Maps 9 and 11 include only the blocks with no minor obstacles. All four maps can be found in the Map Atlas.

The present surface mining activity in this region suggests that its reserves can be defined as having a high development potential. For example, the May 1985 opening of the Black Beauty Coal Company Cedar Creek Mine (Schuyler County, Illinois) is a case in point. Under the terms of a ten-year contract beginning in 1985, the Cedar Creek Mine will produce 600,000 to 750,000 tons of coal per year for all three Meredosia Power Station electric generating units of Central Illinois Public Service Company (Morgan County, Illinois). Shipments will move by truck from Camden, Illinois to the Illinois River and then by river barge to the coal-fired plant. The coal at the Cedar Creek Mine is from the Colchester Member. In total, there are three operating surface mines in the region which produced 1,572,087 tons of coal in 1989. This output was about eight percent of the total 1989 production of 19,603,356 tons of surface mined coal in Illinois. Table X-3 lists those mines by owner, name and county (Illinois Department of Mines and Minerals yearly). Also, according to each mine's 1988 report to the Illinois Department of Mines and Minerals (Table 2: Mine Characteristics), Table X-3 includes Estimated Remaining Recoverable Reserves (in Tons) and Estimated Remaining Mine Life.

TABLE X-3

SURFACE MINES IN NINE-COUNTY REGION

Owner	Mine Name	County	Reserves	Mine Life
Black Beauty Coal Company	Cedar Creek	Schuyler	5,653,710	6 years
Freeman United Coal Company	Industry	McDonough	10,732,000	10 years
Mid State Coal Company	Rapatee	Fulton	19,046,900	30 years

Accordingly, the block-by-block data in Appendix 2 (pp. 21-33) were used to derive the amount of surface-minable reserves with high development potential for all coal as well as for only Springfield and Herrin coal in each of the counties in the nine-county region. County-by-county estimates also were computed by depth of overburden for all blocks and for only those blocks with no minor obstacles. Recall that blocks with major obstacles were excluded from the outset. All of the minor obstacles present in the region were either a highway, pipeline, railroad and/or stream which ran anywhere through a block or block surface area and/or the block was adjacent to a municipality. The detailed results of these computations are contained in Appendix G of this report. Since Appendix 2 expressed county proportions of multicounty blocks in whole percentages, slight differences exist between these computed findings and those reported in Table 1 (p. 5). These small disparities for the grand totals for all reserves in the nine-county region and for each of its constituent counties are reported in Table X-4.

The nine-county region contained approximately 2.7 billion tons of surface-minable coal with high development potential. Of that 2.7 billion tons, roughly 1.9 billion tons were Springfield or Herrin coal. These totals, as well as their constituent

subtotals (categorized by coal type, depth of overburden and presence or absence of minor obstacles), are estimates of coal reserves using July 1975 data. In order to more accurately reflect the present situation, the amounts of similarly categorized reserves mined between July 1975 and December 1989 must be deleted. Given contemporary surface mining technology and losses due to cleaning and processing, approximately 80 percent of the amount of mined reserves results in marketable coal. Total production equals 80 percent of stripped reserves. Therefore, dividing production by 0.8 (or, equivalently, multiplying it by 1.25) will yield a close approximation of stripped reserves.

TABLE X-4

TOTAL JULY 1975 COAL RESERVES

(MILLION TONS)

All Coal

County	Computations From Appendix 2, (pp. 21-33)	Table 1 (page 5)	Difference
Bureau	149.357	149.515	-0.158
Fulton	657.271	657.629*	-0.358
Henry	202.251	201.246	1.005
Knox	500.532	500.991#	-0.459
McDonough	78.303	78.183	0.120
Peoria	643.919	642.240	1.679
Schuyler	191.931	191.460	0.471
Stark	266.147	267.990	-1.843
Warren	54.527	54.563	-0.036
TOTAL	2,744.238	2,743.817	0.421

Springfield and
Herrin Coal Only

County	Computations Appendix 2, (pp. 21-33)	From Table 1 (page 5)	Difference
Bureau	94.268	94.453	-0.185
Fulton	387.663	387.871*	-0.208
Henry	142.688	141.656	1.032
Knox	369.328	369.799#	-0.471
McDonough	--	--	--
Peoria	603.385	601.816	1.569
Schuyler	84.663	84.663	0.000
Stark	263.136	264.872	-1.736
Warren	--	--	--
TOTAL	1,945.131	1,945.130	0.001

* Since publication in 1978, block 44 (14.382 M tons) was found to be mined out. Differences are due to rounding of whole percentage allocations of multicounty blocks to relevant county totals.

\# Block 133 not included.

Monthly production (total and by depth of overburden) and relevant categorical information were collected for all operating surface mines in the nine-county region (including those mines no longer in existence) for July 1975 to December 1989 (Illinois Department of Mines and Minerals yearly). Production and stripped reserve estimates were computed for all coal as well as for only Springfield and Herrin coal, by depth of overburden, and for all blocks and for only those with no minor obstacles. Calculated amounts of July 1975 to December 1989 stripped reserves were subtracted from corresponding categories of estimated July 1975 reserves. This yielded categorical estimates of surface-minable coal reserves as of January 1990. All of the collected and computed quantities are recorded in Appendix G of this report. The nine-county region summary findings for all coal and for only Springfield or Herrin coal are presented in the Tonnage columns in Table X-5.

Depending on the category used, as of January 1990, approximately 683.3 million to 2.7 billion tons of surface-minable coal reserves with high development potential were in the nine-county region. Of those totals, approximately 334.5 million to 1.9 billion tons were Springfield or Herrin coal. This does not include the coal underlying the Salem Township petition area. These 1990 reserve estimates are for other (than Salem Township) coal, coal which is contained in blocks meeting the surface-minable reserves (with high development potential) criteria and lying within 60 miles of Salem Township. The Salem Township block (block #133) was excluded from the original 1975 reserve estimates and, therefore, also from the calculated 1990 estimates.

In addition, a summary indicator was computed for each 1990 reserve category for purposes of comparative assessment. The aim of this section is to accurately

compare the amount of Salem Township coal with the quantity of other available surface-minable coal. This contextual relationship can be quantified by using the Illinois State Geological Survey estimate of 48.1 million tons of Salem Township coal and the 1990 reserve estimates. These magnitudes are based on the same geological methodology and are comparable. By dividing the amount of Salem Township coal into the amount of each 1990 coal reserve category, one can derive a useful set of comparative indicators. For each reserve category, the resulting quantity indicates the amount of other coal for each ton of Salem Township coal. A more complete operational definition would be estimated tons of surface-minable coal with high development potential situated within 60 miles of Salem Township per ton of coal contained in the Salem Township petition area. These estimates are reported in the 'Other Coal Tons per Salem Township Ton' columns of Table X-5. Depending on the reserve category utilized, for each estimated ton of Salem Township coal, there were in January 1990 roughly 14 to 56 other tons available for surface mining in the nine-county region, with approximately 7 to 40 tons being Springfield or Herrin coal.

TABLE X-5
SURFACE-MINABLE COAL RESERVES WITH HIGH DEVELOPMENT POTENTIAL:
NINE - COUNTY REGION[1]*

Category of Reserves		All Coal: Tonnage (Millions of tons)	All Coal: Other Coal Tons per Salem Twp. Ton[2]	Springfield and Herrin Coal: Tonnage (Millions of tons)	Springfield and Herrin Coal: Other Coal Tons per Salem Twp.Ton[2]
	1975-1989 Production	43.58	--	29.17	--
	1975 Reserves	2,744.24	--	1,945.13	--
Including Blocks	1975-1989 Stripped Reserves[3]	54.48	--	36.44	--
with Minor	1990 Reserves[4]	2,689.76	55.92	1,908.69	39.68
Obstacles[5]	Max. 75 ft. Overburden	1,521.03	31.62	742.64	15.44
	Max. 60 ft. Overburden	1,171.43	24.35	657.73	13.67
	Max. 50 ft. Overburden	1,141.67	23.74	656.05	13.64
	1975-1989 Production	43.58	--	29.17	--
	1975 Reserves	1,421.28	--	822.13	--
Excluding Blocks	1975-1989 Stripped Reserves[3]	54.48	--	36.44	--
with Minor	1990 Reserves[4]	1,366.80	28.42	785.69	16.33
Obstacles[5]	Max. 75 ft. Overburden	976.06	20.29	397.65	8.27
	Max. 60 ft. Overburden	703.32	14.62	336.14	6.99
	Max. 50 ft. Overburden	683.27	14.21	334.46	6.95

* Notes appear on next page.

An identical analysis was done for the coal in Knox County only. The findings are reported in Table X-6. Again, the results are for January 1990 and final conclusions depend on the reserve category used. In summary there were 207 to 493 million estimated tons of surface-minable coal reserves with high development potential in Knox County. Springfield or Herrin coal comprised approximately 121 to 362 million of those tons. This translates into approximately 4 to 10 tons of other coal available per estimated Salem Township ton, of which roughly 3 to 8 tons were Springfield or Herrin coal.

Notes for Table X-5 and Table X-6.

1.) The counties of Bureau, Fulton, Henry, Knox, McDonough, Peoria, Schuyler, Stark and Warren. Knox is adjacent to five of the other eight counties. All coal blocks in these counties are within 60 miles of Salem Township. In 1985, Black Beauty Coal Company began production of Colchester coal at its Cedar Creek Mine in Schuyler County (block 66). This mine will produce 0.60 to 0.75 million tons of coal per year for 10 years under stipulations of a long-term contract with Central Illinois Public Service Company (Meredosia, Illinois).

2.) Noted reserve divided by 600,000. The entire Salem Township block (block # 133) was not included in the 1975 reserve estimates. Therefore, these quantities indicate the amount of other coal (in tons) per ton of Salem Township coal.

3.) Production = 80% of Stripped Reserves

4.) 100 foot maximum overburden

5.) Minor Obstacles = highway, pipeline, railroad and/or stream runs through block or block surface area and/or block adjacent to a municipality.

Sources: 1975 Reserves: Treworgy, Bengal and Dingwell, 1978, Appendix 2,pp. 21-33.

1975-1989 Production: Illinois Department of Mines and Minerals, yearly.

TABLE X-6

SURFACE-MINABLE COAL RESERVES WITH HIGH DEVELOPMENT POTENTIAL: KNOX COUNTY[1]*

Category of Reserves		All Coal: Tonnage (Millions of tons)	All Coal: Other Coal Tons per Salem Twp. Ton[2]	Springfield and Herrin Coal: Tonnage (Millions of tons)	Springfield and Herrin Coal: Other Coal Tons per Salem Twp.Ton[2]
	Production 1975-1989	5.66	--	5.66	--
	1975 Reserves	500.53	---	369.33	--
Including Blocks with Minor Obstacles[5]	1975-1989 Stripped Reserves[3]	7.07	--	7.07	--
	1990 Reserves[4]	493.46	10.26	362.26	7.53
	Max. 75 ft. Overburden	419.59	8.72	288.39	6.00
	Max. 60 ft. Overburden	308.93	6.42	205.45	4.27
	Max. 50 ft. Overburden	303.86	6.32	205.04	4.26
	1975-1989 Production	5.66	--	5.66	--
	1975 Reserves	341.49	--	222.59	--
Excluding Blocks with Minor Obstacles[5]	1975-1989 Stripped Reserves[3]	7.07	--	7.07	--
	1990 Reserves[4]	334.42	6.95	215.52	4.48
	Max. 75 ft. Overburden	299.60	6.23	180.70	3.76
	Max. 60 ft. Overburden	212.35	4.41	121.17	2.52
	Max. 50 ft. Overburden	207.40	4.31	120.76	2.51

* Notes appear on previous page.

D. MARKET DEMAND FOR COAL AND COAL FLOWS

Contemporary researchers uniformly conclude that the demand for coal in general should remain steady or continue to increase. The estimated present and projected coal demand locally (near Salem Township), statewide, regionally (multistate, subnational), nationally and worldwide are presented in that order in this section. In addition, estimates of present and future Illinois coal production will be presented as well as estimates of the flow of that production in meeting state, regional and national demand.

Local Demand

Exact records of total coal consumption for substate areas are unavailable. However, utilities purchase the overwhelming majority of United States (and Illinois) production for their coal-fired electricity generating plants. For example, as related in an Illinois Department of Transportation study, "utility purchases represent approximately 90 percent of Illinois coal sales." Moreover, "utilities generally enter contracts with mining companies that span 25 to 30 years" (1983, p. 59). Therefore, an estimate of local coal demand can be derived from the annual amount of coal purchased by utility plants operating near the relevant locale. The estimate would come close to approximating total local coal consumption and would be stable over time.

Five coal-fired electric generating units are located in the immediate vicinity (within 60 miles) of Salem Township. Table X-7 presents the utility owner, name, location

TABLE X-7

COAL-FIRED ELECTRIC GENERATING UNITS

Unit Name	County	Locale	Coal Suppliers
Central Illinois Light Company (CILCO)			
Duck Creek	Fulton	near Canton	1. Freeman United Coal Company (Illinois)
			2. Mid State Coal Company (Illinois)*
E.D. Edwards	Peoria	Peoria	1. Freeman United Coal Company (Illinois)
			2. Blue Diamond Mining Inc. (Kentucky)
			3. Lake Coal Company (Kentucky)
			4. Mid State Coal Company (Illinois)*
			5. Blue Crystal Coal Company (Kentucky)*
			6. Arch of Kentucky (Kentucky) *
			7. Millers Cove Coal Company (Kentucky)*
			8. Peabody Coal Co. (West Virginia) *
			9. Westmoreland Coal Co. (W. Virginia) *
Commonwealth Edison Company (Com Ed)			
Powerton	Tazewell	near Pekin	1. Decker Coal Company (Montana)
			2. Big Horn Coal Co. (Wyoming)
			3. Black Butte Coal Company (Wyoming)
Illinois Power Company (IP)			
Havana	Mason	Havana	1. Reading and Bates Coal Co. (Kentucky)
			2. ANR Coal Sales Inc. (Kentucky) *
			3. Blue Diamond Coal Co. (Kentucky) *
			4. Kessler Coal Inc. (West Virginia) *
Hennepin	Putnam	near Hennepin	1. AMAX Coal Company (Illinois)
			2. Peabody Coal Company (Illinois)

* = spot market purchases (all others contractual purchases)

Sources: Illinois Commerce Commission, monthly; and Ellis, 1989.

and recent major coal suppliers of the five units. Of these five units, three (CILCO Duck Creek and E. D. Edwards as well as IP Hennepin) have consumed Illinois coal recently.

Data on coal consumption for these five units for the years 1988 and 1989 were obtained from the relevant utilities' monthly power plant reports to the Federal Power Commission. Each report indicates the amount of coal consumed that month as well as the amount of remaining coal stocks. For any given year, the previous December's reported stock is equal to the amount of coal on hand at the beginning of the year. (The December report indicates the remaining stock at the year's end.) Subtracting beginning stocks from end stocks (to discover how much stock was depleted or added) and adding the result to the summed total of monthly coal consumption yields the total amount of coal bought (demand). This procedure was applied to the 1988 and 1989 data for all five local electric generating units. The summary findings appear in Table X-8. The detailed month-to-month data are reported in Appendix H of this report. Given these findings, one can conclude that the present and likely future demand for coal in the immediate vicinity (within 60 miles) of Salem Township is and will be approximately 5 to 6 million tons annually.

State Demand

Estimates of coal demand in Illinois were taken from three data sources: two U.S. Department of Energy publications (Coal Distribution and Quarterly Coal Report) and a recent Illinois Department of Energy and Natural Resources report (Ellis, 1989). The trend of Illinois demand for coal is delineated in Table X-9. The recent total demand for coal in Illinois as well as the Illinois demand for instate (Illinois)

TABLE X-8

1988 AND 1989 COAL DEMAND OF ELECTRICAL GENERATING UNITS
(TONS) (1988)

Unit	Beginning Stock	Jan.-Dec. Consumption	End Stock	End Stock-Beginning Stock	Total Bought
CILCO					
Edwards	265,818	1,277,951	145,872	-119,946	1,158,005
Duck Creek	153,414	923,384	167,751	14,337	937,721
COM ED					
Powerton	1,387,122	2,397,058	1,764,883	377,761	2,774,819
IP					
Havana	109,851	493,607	211,841	101,990	595,597
Hennepin	229,696	683,634	167,361	-62,335	621,299
TOTAL	2,145,901	5,775,634	2,457,708	311,807	6,087,441
		(1989)			
CILCO					
Edwards	145,872	1,247,328	160,070	14,198	1,261,526
Duck Creek	167,751	917,846	245,509	77,758	995,604
COM ED					
Powerton	1,764,883	2,197,589	1,871,894	107,011	2,304,600
IP					
Havana	211,184	650,609	81,963	-129,221	521,388
Hennepin	167,361	661,715	88,454	-78,907	582,808
TOTAL	2,457,051	5,675,087	2,447,890	-9,161	5,665,926

Source: Federal Power Commission, monthly.

and out-of-state (imported) coal is presented. While coal demand in other geographic units (local, regional, national, worldwide) has remained constant or increased, coal demand in Illinois has declined by about 20 percent from 1984 to 1988.

TABLE X-9

COAL DEMAND IN ILLINOIS (MILLION TONS)

Year	1984	1985	1986	1987	1988
Coal Imports to Illinois	17.960	17.619	19.126	16.747	15.631
In-State Use of Illinois Coal	24.518	20.480	21.008	19.868	18.469
Total Illinois Coal Demand	42.478	38.099	40.134	36.615	34.100

Sources: EIA, 1989; USDOE, 1989 and Ellis, 1989.

Regional Demand

In the recent past as well as presently, approximately 99 percent of Illinois coal has been consumed in 15 of the continental United States. (This will be demonstrated shortly in the coal flow section of this chapter.) The present demand for coal within these 15 states is defined as the relevant regional demand. The demand region states are Alabama, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Mississippi, Missouri, Ohio, Tennessee and Wisconsin. Again, the U.S. Department of Energy Energy Information Agency (EIA) Coal Distribution as well as Ellis (1989) are the respective sources for the relevant data. Some demand region states' data are collapsed into single categories. Table X-10 presents the findings. In sum, the regional demand for coal has been steady at about 400 million tons per year.

TABLE X-10

REGIONAL DEMAND FOR COAL (MILLION TONS)

State(s)	1984	1985	1986	1987	1988
Illinois	38.798	37.021	38.122	35.362	32.881
Indiana	56.938	50.217	50.422	50.998	48.725
Michigan & Ohio	95.187	88.137	92.734	94.416	92.335
Iowa, Minnesota & Wisconsin	45.183	44.224	43.198	50.722	52.690
Kansas & Missouri	44.296	38.000	36.942	39.305	40.586
Kentucky & Tennessee	51.689	48.734	56.242	57.597	54.248
Alabama & Mississippi	29.234	30.880	33.512	31.022	31.489
Florida & Georgia	42.776	43.128	42.576	51.537	50.507
TOTAL OF REGION	404.101	380.341	393.748	410.959	403.461

Sources: EIA, 1989 and Ellis, 1989.

National and World Demand

Two additional data sources for coal demand were utilized at this point. For the United States' coal demand, National Coal Association statistics are used. For world demand, statistics provided by the Institute of Gas Technology are utilized. Table X-11 presents the national and world demand findings. The previously cited local, state and regional data are included in order to summarize the complete demand picture. It is assumed that future local and regional demand will approximate the respective present demands. According to the noted sources, including the National Coal Association, the U.S. demand for coal in 1990 is expected to increase to between 973 million and 1.013 billion tons, with 997 million tons being most

likely. Annual world demand has steadily increased, and likely will continue to do so in the near future.

TABLE X-11

THE DEMAND FOR COAL (MILLION TONS)

Demand Area	1984	1985	1986	1987	1988
Local	5-6	5-6	5-6	5-6	5-6
Illinois	42.478	38.099	40.134	36.615	34.100
Regional	404.101	380.341	393.748	410.959	403.461
United States	897.2	885.6	892.5	920.4	951.9
World	2,993.728	3,169.475	3,222.902	3,324.997	N.A

Notes
United States source: Patricia A. Grupe (ed.), Coal Data 1989 (Washington, D.C.: National Coal Association, 1989).

World source: Institute of Gas Technology, Energy Statistics Chicago, IL

N.A. = Not Available

Illinois Coal Flow

Historically, Illinois has been a major supplier of coal in the United States. Moreover, present Illinois coal production fulfills, in part, the regional and national demands previously specified. The structure of the recent (supply to demand) flow of Illinois coal sales to electric generating plants is presented in Table X-12. Recall that sales to electric utilities constitute the overwhelming majority (about 90%) of all Illinois coal purchases; and they tend to be governed by long-term (25 to 30 year) contractual agreements. Moreover, approximately 99 percent of Illinois production in both 1986 and 1988 flowed to the relevant (already defined 15-state) subnational demand

region. About 30 percent of Illinois coal was consumed in Illinois in 1986, while the 1988 figure was roughly 27 percent. Conversely, about 70 percent of Illinois coal was exported in 1986 and approximately 73 percent in 1988.

TABLE X-12

FLOW OF ILLINOIS COAL SUPPLY (MILLION TONS)

	1986		1988	
Demand Area	Amount	% of Total	Amount	% of Total
Illinois	17.063	30	14.351	27
Indiana	10.214	18	9.001	17
Michigan & Ohio	--	--	0.048	--
Iowa, Minnesota & Wisconsin	3.575	6	4.371	8
Kansas & Missouri	13.138	23	13.787	26
Kentucky & Tennessee	2.980	5	1.205	2
Alabama & Mississippi	0.485	1	1.053	2
Florida & Georgia	9.544	17	9.935	18
TOTAL	56.999	100	53.751	100

Source: Ellis, 1989.

E. ECONOMIC ISSUES

The proposed surface mining operation in Salem Township could affect the fiscal health of local governments in Knox County and the government of the State of Illinois. The amount of potential state and local sales, as well as local property, tax revenues generated by a Salem Township mine must be considered. Similar factors regarding potentially affected farm lands also must be taken into account. Whether or not new local revenues are able to meet anticipated social service expenditures is an important question. In a larger sense, a Salem Township mine probably would have a secondary as well as an immediate impact on the entire Illinois economy. The

added value of the coal sales could pass through the hands of many individuals and enterprises statewide. Would this offset the maximum possible loss of the economic value of the affected farmland? If so, by how much? The purpose of this section is to assess and evaluate these economic issues.

Future Coal Prices

To a large extent, the economic impact of a surface mine will depend upon the future market value of Salem Township coal. In turn, this will depend upon the future price of Illinois coal. Credible forecasts of future coal prices can be derived by observing relevant prices in the recent past. Table X-13 delineates the contemporary history of Illinois coal prices. The conclusion is that for purposes of these economic analyses the price of Salem Township coal in the foreseeable future will be about $36 per ton or approximately $1.60 per million Btu's.

TABLE X-13

ILLINOIS COAL SALES TO ELECTRIC UTILITIES

Year	1984	1985	1986	1987	1988
Million Tons	57.601	54.196	56.999	55.481	53.751
Average Btu's per pound	11,027	11,075	11,113	11,158	11,183
Average Dollars per Ton	36.05	36.80	36.19	37.11	36.48
Mean $'s per million Btu's	1.63	1.66	1.63	1.66	1.63
% of Total Production	88	90	90	91	93
Average Percent Sulfur	2.70	2.20	2.59	2.60	2.56

Source: Ellis, 1989, Table 1-4, p. 10.

Market Value and Sales Tax Revenues

Since best-available price projections have been made, the future market value of Salem Township coal can be forecasted. The ISGS has estimated that Mid State would realize 33 million tons of marketable coal if the entire Salem Township petition area is mined. Mid State estimates the amount of saleable coal at 29 million tons. The total market value can be projected by multiplying the corresponding price forecast by the total potential production. Since the Mid State 29 million tons estimate is approximately 88 percent of the ISGS 33 million tons estimate (29 / 33 = 0.88), the total market value using the Mid State estimate also will be 88 percent of the market value computed from the ISGS estimate. Indeed, multiplying 29 million tons by $36 per ton yields $1.044 billion, while doing the same for 33 million tons results in a total potential market value of $1.188 billion.

In effect, should the entire petition area be surface-mined, the resulting total revenue from the sale of that coal, over the life of the mine, in constant 1989 dollars, would be between 1.044 and 1.188 billion dollars. These findings are presented in Table X-14. Again, the total market value of Salem Township coal should fall between the low estimate of approximately $1.044 billion and the high estimate of about $1.188 billion, in constant 1989 dollars.

Total market value can be used to compute state and local sales tax revenues. Beginning on January 1, 1990, the sales tax rate on all goods except food and medicine was 6.25 percent. The amount of sales tax is 0.0625 times the sale price (market value). The sales tax on retail sales of food and medicine is 1 percent. So, 0.01 times the retail price of farm produce and medicine yields the relevant sales tax

revenue. Distribution of each dollar of sales tax for all goods except food and medicine is portrayed in Table X-15. For retail sales of food and medicine, the entire 1 percent (one cent on the dollar) goes to the relevant county and municipality where the sale occurred (Illinois Department of Revenue, personal communication, March 3, 1990).

These proportions can be applied to the various estimates of the market value of Salem Township coal. The results will be the total estimated state and local sales tax revenues as well as vendor collection fees that could be generated by a mine at Salem Township. Summary findings for state and local sales tax revenues are presented in Table X-16.

TABLE X-14

ESTIMATES OF TOTAL MARKET VALUE OF SALEM TOWNSHIP COAL
(CONSTANT 1989 DOLLARS)

Tonnage Estimate (Tons)		Price Estimate (Dollars per Ton)		Total MarketValue (Constant 1989 Dollars)
29,000,000	X	36	=	1,044,000,00
33,000,000	X	36	=	1,188,000,00

TABLE X-15

DISTRIBUTION OF SALES TAX

Proportion of Amount Market Value	Amount (in cents)	Recipient
0.0011	1.75	Kept by seller (vendor) as sales tax collection fee
0.0614	98.25	Sent to Illinois Department of Revenue; of which
0.0491	78.60	Sent to State of Illinois General Fund (state sales tax revenue)
0.0123	19.65	Sent back to relevant county and municipality (local sales tax revenue)

Source: Illinois Department of Revenue

TABLE X-16

SALES TAX REVENUES (CONSTANT 1989 DOLLARS)[1]

Governmental Unit	Lowest Estimate[2]	Highest Estimate[3]
State of Illinois	51,260,400	58,330,800
Knox County	12,481,200	14,612,400

Notes:

1.) State sales tax revenue equals 0.0491, and local sales tax revenue 0.0123, times the total market value.

2.) 29 million tons of coal. Total market value estimate equals $1,044,000,000.

3.) 33 million tons of coal. Total market value estimate equals $1,188,000,000.

If Salem Township is mined, it is estimated that the State of Illinois could receive a total of approximately $51 to $58 million in sales tax revenue over the life of the mine. Knox County could receive about $12 to $15 million. However, this assumes that 100 percent of the Salem Township coal will be sold instate. According to the Revenue Code, there is no sales tax on coal sold out of state. Any proportion of the production of a Salem Township mine which is exported would decrease the estimated state and local sales tax revenue by that proportion. For example, if 100 percent of the production of a Salem Township mine is sold to an Iowa customer, like the Freeman United Coal Company Industry Mine (McDonough County, Illinois), then the state and local sales tax revenues would be zero.

While the Mid State Rapatee Mine's entire production is now sold instate, at present, for obvious reasons, Mid State has no contracted or prospective customer for the Salem Township coal. However, as was demonstrated in the Illinois Coal Flow section (page X-23), approximately 70 percent of Illinois coal is exported, and this is likely to persist. Given various proportions of Salem Township coal exports, Table X-17 presents the resulting total state and local sales tax revenues. While all of these

TABLE X-17

SALES TAX REVENUES BY COAL EXPORTS
(CONSTANT 1989 DOLLARS)

Proportion of Salem Township Coal Exported	State Sales Tax Revenue: Lowest[1] Estimate	State Sales Tax Revenue: Highest[2] Estimate	Local Sales Tax Revenue: Lowest[1] Estimate	Local Sales Tax Revenue: Highest[2] Estimate
0.00	51,260,400	58,330,800	12,481,200	14,612,400
0.25	38,445,300	43,748,100	9,360,900	10,959,300
0.30	35,882,280	40,831,560	8,736,840	10,228,680
0.50	25,630,200	29,165,400	6,240,600	7,306,200
0.70	15,378,120	17,499,240	3,744,360	4,383,720
0.75	12,815,100	14,582,700	3,120,300	3,653,100
1.00	-0-	-0-	-0-	-0

Notes:
1.) Lower bound total market value.
2.) Upper bound total market value.

scenarios are possible, if Salem Township coal follows the norm for Illinois coal (70% exported), then the anticipated state sales tax revenue will be approximately \$15 to \$18 million. Knox County could anticipate about \$4 million dollars in sales tax revenue over the life of a Salem Township mine.

In addition, some productive farm lands will be affected directly if Salem Township is mined. According to the Knox County Supervisor of Assessments records, the petition area contains 4,580 acres of cropland, 2,033 acres of permanent pasture and 232 acres of other land uses, for a total acreage of 6,845. Therefore, farmland involves 67 percent of the petition area and permanent pastures 30 percent with 3

percent in other land uses. On the other hand, Mid State estimates the petition area to be about 6,400 acres with 62 percent devoted to cropland, 35 percent to pastures and 3 percent to other land uses. That works out to 3,968 acres of cropland, 2,240 acres of pastures and 192 acres of other land uses. Moreover, Mid State estimates that only 3,122 acres of farmland are underlain with economically recoverable coal. That is, 79 percent (3,122 / 3,968) of the Mid State cropland estimate is underlain with marketable coal. Applying 79 percent to the Knox County total of 4,580 acres yields a higher estimate of 3,618 acres of potentially affected cropland. In short, given these two estimates, there are about 3,100 to 3,600 acres of crop producing land within the petition area that may be disturbed should the area be mined.

From 1985 through 1989, the average annual yield of Knox County farm land was 111 bushels of corn or 42 bushels of soybeans per acre. The average price was $2.50 per bushel of corn and $5.82 per bushel of soybeans (Illinois Crop Reporting Service 1986-1990). Therefore, the annual market value of corn crops harvested from the potentially affected farmlands can be estimated to be between about $0.86 million (3,100 acres x 111 bushels/acre x $2.50/bushel = $860,250) and $1.00 million (3,600 acres X 111 bushels/acre X $2.50 bushel = $999,000). The estimate for soybeans is between about $0.76 million (3,100 acres x 42 bushels/acre x $5.82/bushel = $757,764) and $0.88 million (3,600 acres X 42 bushels/acre X $5.82/bushel = $879,984). However, it is very unlikely that any of this roughly $1 million annual food production will generate sales tax revenue for Knox County or the State of Illinois. According to the Revenue Code, while a one percent levy is earmarked for local governments, sales tax on farm produce is assessed only at the retail level. The sale of crops from the farmstead (to, for example, a grain elevator) is a wholesale transaction. The only exception would be a farmer selling his produce at a local farmers' market or from a roadside stand. However, such sales could be only a

minuscule proportion of the produce grown within the petition area. Therefore, for all practicable purposes the sales tax from petition area crops is zero. Moreover, according to the Illinois Department of Revenue, the final wholesale or ultimate retail sale of most Illinois corn occurs out-of-state, for which there is no Illinois sales tax.

Unfortunately, not enough information is available to know with confidence some specific economic comparisons or impacts. Too many variables are unknown. For example, there is no mining plan for the petition area. So the actual life of a surface mine located in the petition area is not known. Therefore, a comparison of the market value of the petition area's coal and crops cannot be made precisely. However, estimates can be made. Presently, the annual production of the Mid State Rapatee Mine is about 550,000 to 600,000 tons per year. The marketable coal under the petition area is between 29 and 33 million tons. So, assuming Rapatee production rates, the total life of a Salem Township surface mine would be between a low estimate of 48 years (29,000,000 / 600,000) and a high estimate of 60 years (33,000,000 / 550,000), for an average estimate of about 55 years. The total market value of a Salem Township mine was estimated to be between $1.044 and $1.188 billion. Dividing both figures by 55 yields an estimate of the average annual market value for coal of about $19 million ($18,981,819) to $22 million ($21,600,000). Since the estimated annual market value of the food raised in the petition area is roughly $1,000,000, therefore it would take about 19 to 22 years of crops to equal the market value of one year of coal production. However, this assumes that all the coal under the petition area would be mined, that coal and food production rates would stay constant, and that the price and markets for coal and food also would stay constant.

Property Tax Revenue

Any plan for a surface mining operation in the Salem Township petition area would involve the transfer of farm and nonfarm land holdings between a number of private owners and Mid State. In order to mine them, Mid State would have to acquire use of relevant Salem Township lands. During mining, these land transfers would not effect the property tax revenues of Knox County. Affected land would be assessed at its present Equalized Assessed Valuation (EAV). However, after mining and reclamation, reassessment likely will result in reduced EAV, causing the permanent loss of property tax revenues. This section will present an analysis of the impact of these land transfers on Knox County property tax revenues. Many acreage estimates are from the office of the Knox County Supervisor of Assessments (Knox County). Mid State as well as ISGS estimates also are presented for comparative purposes.

According to Knox County the petition area is about 6,845 acres, with 3,783 acres being prime farmland, 797 acres of other cropland, 2,033 acres of pasture and 232 acres of other land uses. According to Mid State, the petition area is 6,400 acres, with 3,968 acres of cropland, 2,240 acres of pasture and 192 acres of other land uses. The ISGS estimates that the total petition area is 6,444 acres with 3,944 acres in cropland, 2,368 acres of pasture and 132 other acres. Table X-18 portrays these findings.

TABLE X-18

ESTIMATES OF LAND USES WITHIN SALEM TOWNSHIP PETITION AREA

	Knox County		Geological Survey		Mid State	
Land Use	Acres	%	Acres	%	Acres	%
Cropland	4,580	67	3,944	61	3,968	62
Pasture	2,033	30	2,368	37	2,240	35
Other	232	3	132	2	192	3
TOTAL	6,845	100	6,444	100	6,400	100

Sources: Office of the Knox County Supervisor of Assessments, Mid State and the Illinois State Geological Survey (1990).

Moreover, Mid State estimates that only about 4,400 acres of land are underlain with coal and might be affected. That is, only 69 percent of the petition area would be affected. Similarly, Mid State estimates that only about 3,100 acres of the roughly 4,000 acres of farmland would be affected (79%), 1,100 of the 2,200 acres of pasture (50%) and 160 of the 190 acres of other uses (85%). Somewhat different, the ISGS estimates that about 5,400 acres (84% of the total 6,444 acres in the petition area) are underlain with coal. Of the roughly 3,900 acres of cropland, about 3,500 acres (88%) would be affected. Similarly, 1,800 of the 2,400 acres of pastures (76%) and 100 of the 130 acres in other land uses (76%) are underlain with minable coal. These estimates are summarized in Table X-19.

TABLE X-19

MID STATE AND ISGS ESTIMATES OF AFFECTED LAND USES

Land Use	Geological Survey Acres	Geological Survey %	Mid State Acres	Mid State %
Prime Farmland (Ipava, Sable & Tama)	--	--	2,304	52
Other Prime and Non-Prime Farmland	--	--	818	19
Total Cropland	3,479 (88% of 3,944)	65	3,122 (79% of 3,968)	71
Pasture	1,805 (76% of 2,268)	34	1,121 (50% of 2,240)	25
Other	100 (76% of 132)	2	163 (85% of 192)	4
TOTAL	5,384 (84% of 6,444)	100	4,406 (69% of 6,400)	100

Sources: Illinois State Geological Survey and Mid State (1990).

In short, approximately 4,400 to 5,400 acres of land may be affected by a Salem Township mine. About 3,100 to 3,500 of those acres would be cropland, 1,100 to 1,800 acres would be pastures and 100 to 160 acres would have been in other land uses.

According to the Knox County Supervisor of Assessments, the lands within the petition area are under six separate taxing codes with an average tax rate of $6.13 per $100 EAV. These tax rates would continue to be applied to the land within the petition area during the life of any mine. Moreover, some additional property tax assessment could be made on any mine. The State of Illinois Revenue Code permits an assessment and property tax on the commercial value of the coal as well as the

value of on-site mining machinery and structures. However, this taxation is at the discretion of local governments and assessors, and is unknown. So, this analysis will focus on property taxes generated by land value and land use only. Also, since property taxes are unchanged during mining, the focus here is on likely post-mining changes in property taxes.

Any reclamation is required to return disturbed cropland to its pre-mining productivity characteristics. However, the petitioners allege that at best any farmland within the petition area can be reclaimed only to the characteristics of the Rapatee (872 B) soil. Therefore, any farmland acreage with a productivity greater than that for Rapatee soil would, post-mining, be at a lesser productivity. Any cropland more productive than Rapatee soil also has a greater EAV than Rapatee's $144 per acre. So, any and all more-productive soil reclaimed as Rapatee would constitute a property tax loss for Knox County. Indeed, according to the records of the Supervisor of Assessments, this has been the case in Knox County. It should be noted that any land with an EAV less than the $144 per acre EAV for Rapatee soil could and would be returned to its original productivity and EAV. The mining of that land could not constitute any post-mining loss of property tax revenue.

The current records of the Knox County Supervisor of Assessments were used by the Knox County Zoning Department to estimate the relevant acreages of lands within the petition area by soil type, land use and EAV. Table X-20 delineates the applicable data for all soils with an EAV greater than that for Rapatee 872 B ($144 per acre). Note that farmland is assessed at 100 percent of EAV, pastures at 33 percent of EAV and "other" farming uses at 17 percent of EAV.

TABLE X-20

SOILS IN THE PETITION AREA WITH AN EAV GREATER THAN THAT FOR RAPATEE 872 B SOIL ($144 / ACRE) BY EAV AND ACREAGE PER LAND USE

Soil	EAV ($'s/acre)	Farmland (100%)	Pasture (33%)	Other (17%)
43A*	317	771	---	2
36B *	277	1,638	11	---
36B2*	244	570	3	7
68 *	297	139	---	---
451	297	43	---	---
81B	290	11	---	---
77	283	3	---	---
107	250	10	12	---
74	230	123	35	20
36C2 **	217	362	38	14
386B	210	107	4	---
257	197	23	---	---
36D2 **	170	4	---	---
415	151	5	3	---
872B +	144	---	---	---
TOTAL		3,809	96	45

Notes: * = Ipava, Tama or Sable soil (prime farmland); ** = Ipava, Tama or Sable soil (nonprime farmland); + = Rapatee soil. Remaining soil types are termed prime farmland.

Source: Knox County Supervisor of Assessments (1990).

In short, there are approximately 3,950 acres of land with EAV's greater than that for Rapatee within the petition area. All 3,950 acres will likely not be disturbed. Indeed, best available information suggests all potentially disturbed cropland would be between 3,100 and 3,500 acres. However, using the 3,950 figure gives a good estimate of total maximum possible impacts. So, if all these 3,950 acres are mined, restoring those lands to Rapatee soil would involve a loss of assessed value for those acres equal to the summation of the lost assessed value for each soil type present. Each soil type's loss would equal $144 subtracted from its respective EAV, then that amount multiplied by the relevant acreage, and then times 1.00 or 0.33 or 0.17 depending on land use. Table X-21 provides these respective calculations.

TABLE X-21

ANNUAL ASSESSMENT LOSSES

Soil	EAV- $144 ($/acre)	Farmland Loss (X acres X 1.00)	Pasture Loss (X acres X 0.33)	Other Loss (X acres X 0.17)
43A	$173	$133,383	$ ---	$59
36B	133	217,854	483	---
36B2	100	57,000	99	119
68	153	21,267	---	---
451	153	6,579	---	---
81B	146	1,606	---	---
77	139	417	---	---
107	106	1,060	420	---
74	86	10,578	993	292
36C2	73	26,426	915	174
386B	66	7,062	87	---
257	53	1,219	---	---
36D2	26	104	---	---
415	7	35	7	---
TOTAL		$484,590	$3,004	$644

In total, then, Knox County could lose an absolute maximum of about $488,238 in EAV per year should all these soils and acreage be disturbed by a surface mine. Multiplying the total $488,238 EAV by $6.13 / $100 EAV will yield the maximum possible property tax revenue loss. That works out to be $29,929. Therefore, if all these acres were mined Knox County would expect to lose about $30,000 per year in property tax revenue. This would occur after the acreage had been mined and then reclaimed to the best possible condition (Rapatee).

Over subsequent years, the accumulation of this permanent loss eventually would equal (exhaust) the total temporary increment in sales tax revenues generated by any surface mine. Dividing the annual maximum possible loss ($30,000) into the estimated revenues (Table X-17) will yield the time it will take for this to occur. Table X-22 delineates these findings.

TABLE X-22

PERIOD OF TIME FOR PERMANENT PROPERTY TAX REVENUE LOSS TO EQUAL TEMPORARY TOTAL ADDITIONS TO SALES TAX REVENUE FOR KNOX COUNTY (YEARS)

Proportion of Salem Township Coal Exported	Lowest Estimate of Sales Tax Revenue	Highest Estimate of Sales Tax Revenue
0.00	416	487
0.25	312	365
0.30	291	341
0.50	208	244
0.70	125	146
0.75	104	122
1.00	-0-	-0-

So, depending on the amount of coal exported, it would take from 0 to 487 years for the permanent losses to equal the temporary additions to Knox County tax revenues. Afterwards, the $30,000 annual loss would be uncompensated.

Local Expenditures for Social Services

At most, should Mid State be permitted to mine the petition area, an additional ten (10) individuals would be employed at the mine over and above the present workforce of 79 at the Rapatee Mine. Moreover, Mid State anticipates using presently established infrastructure, haul roads and coal processing facilities. Therefore, it is unlikely that the social service costs of Knox County will increase at all over and above what the county already bears due to the presence of the Rapatee Mine.

Impact on Illinois Economy

In a larger sense, a Salem Township mine probably would have a secondary as well as an immediate impact on the local, regional and the entire Illinois economy. The value of the coal sales added to the economy could pass through the hands of many individuals and enterprises statewide. The impacts could be registered in additional employment, increased personal income and enhanced government revenues. However, the economic value of the potentially affected farmland is similarly, but not identically, felt in the local, regional and Illinois economy. The question is: would the impact of a Salem Township mine offset the maximum possible loss of the economic value of the farmland. If so, by how much? This section will attempt to answer those questions. The findings will be presented in terms of the separate impact of the loss of the present Rapatee mining operation as well as the net impact of the addition of the economic value of a Salem Township mine and the maximum possible loss of the economic value of the relevant cropland.

The primary tool for this analysis will be the Illinois Forecasting and Simulation Model (ILFS) developed by Regional Economic Models, Incorporated (REMI) (Treyz and Ehrlich 1982). REMI/ILFS is a computer-based econometric model designed specifically for the Illinois economy. It takes into account the historic structural behavior of the Illinois economy between 1967 and 1987. It is designed to evaluate the primary (direct) and secondary (indirect) economic consequences of any change in the Illinois economy. REMI/ILFS is quite advanced in that it combines a forecasting/simulation model with standard input-output analysis. The user can change one or more of 850 policy variables. The changes establish the parameters (specifications) of an economic simulation which is evaluated in terms of a 500

sector input-output matrix (framework) of the behavior of the Illinois economy. The matrix framework is structured in terms of the 1967 to 1987 economic relationship among each sector and the other 499. The input-output evaluation results in forecasts of the likely impact of the specified simulation. Forecasts can extend to 2015. (For another explanation of REMI/ILFS, see Illinois Department of Energy and Natural Resources 1982, pp. 47-8).

The model can be made applicable to seven substate regions in Illinois as well as to the state as a whole. Here, the relevant region is a 15-county area in northwest central Illinois composed of the counties of Bureau, Fulton, Hancock, Henderson, Henry, Knox, Marshall, McDonough, Peoria, Putnam, Rock Island, Stark, Tazewell, Warren and Woodford. Results of REMI/ILFS analyses will be presented for this region and for the entire state.

For the first simulation, the loss of 79 mine employees per year was entered into REMI/ ILFS. Mid State presently employs 79 people at its Rapatee Mine. If the Salem Township petition area is declared unsuitable for surface mining, then, after 30 years, when the Rapatee Mine's coal reserves become exhausted, 79 mining employees would become unemployed.

An additional simulation was run; and it also involved inputs of annual quantities. The relevant variables were the addition of ten mine employees and the loss of $1,000,000 in corn crops. If Mid State can mine Salem Township, an additional ten employees would be needed. This would occur at a maximum possible cost of the loss of $1,000,000 per year in farm production. Here, REMI/ILFS measures the net effect of this set of additions and losses.

Summary findings of these two simulations are presented in Table X-23. REMI/ILFS monetary findings are expressed in constant 1989 dollars. REMI/ ILFS estimates that a Salem Township surface mine would cost approximately six (6) jobs in the region and one (1) job statewide. This is due to the differential average labor and proprietors' income for mining as opposed to farming operations. Approximately 10 jobs would be added in the mining sector itself, while about 11 to 16 jobs in other sectors (the secondary employment impact of a Salem Township mine) would be lost. In addition, net, about $20,000 in real disposable income would be lost in the region per year, while the state would gain $60,000 in real disposable income. Again, this is due to differential income rates. The state stands to gain about $30,000 in income taxes per year.

TABLE X-23

IMPACT ON REGIONAL AND ILLINOIS ECONOMY: REMI/ILFS SIMULATION FINDINGS

	Simulation			
	Rapatee Mine		Addition of 10 Mine Employees & Loss of $1 Million in Agricultural Production	
	Region	State	Region	State
TOTAL EMPLOYMENT[1]	- 151	- 241	- 6	- 1
In mining sector	- 80	- 82	10	10
In other sectors	- 71	- 159	- 16	- 11
TOTAL REAL DISPOSABLE PERSONAL INCOME[2]	- 2.76	- 5.73	- 0.02	0.06
TOTAL STATE INCOME TAXES[2]	- 0.26	- 1.42	---	0.03

[1] Annual number of jobs.
[2] Millions of constant 1989 dollars.
Source: REMI/ILFS

In contrast, if the Rapatee Mine should close, in 30 years, the region would lose a total of about 150 jobs, 80 in mining and the rest in other sectors. Statewide the loss would be about 240, again with about 80 in mining and 160 in the rest of the economy. Losses in real disposable income would be roughly $2.75 million per year in the region and $5.75 million for the entire state. The state would lose approximately $260,000 in income taxes from the region and about $1.4 million statewide per year.

F. SUMMARY

Approximately 48.1 million tons of coal reserves underlie the proposed Salem Township petition area. Those reserves are likely to result in about 33 million tons of marketable coal if Salem Township is mined. This coal is from the Springfield and Herrin Coal Members; and, post-cleaning, it would have a sulfur content of roughly 3.0 to 3.1 percent (plus or minus a measurement error of 0.1%).

Within a relevant nine-county region (the counties of Bureau, Fulton, Henry Knox, McDonough, Peoria, Schuyler, Stark and Warren), there are about 680 million to 2.7 billion tons of other surface-minable coal reserves with high development potential. Of those totals, approximately 335 million to 1.9 billion tons are Springfield or Herrin coal. This means that for each ton (of the 48.1 million tons) of Salem Township coal, there are roughly 14 to 56 other tons of coal available for surface-mining in the nine-county region, with about 7 to 40 tons being Springfield or Herrin coal. All applicable coal reserves are contained in blocks that lie within 60 miles of Salem Township. In Knox County alone there are approximately 207 to 493 million tons of other coal reserves with high development potential. Springfield or Herrin coal comprises roughly 121 to 362 million of those tons. This translates

into about 4 to 10 tons of other coal available per estimated Salem Township ton, of which approximately 3 to 8 tons are Springfield or Herrin coal.

Local, regional, national and world demand for coal are expected to remain constant or increase. State demand may continue to decrease somewhat. Annual local demand is estimated to be about 5 to 6 million tons of coal. Annual Illinois demand will be about 34 million tons of coal, while regional demand will be roughly 400 million tons per year (98-99% of Illinois coal is consumed in this region). National demand for coal will be around 950 million tons per year, and annual world demand will be roughly 3.3 billion tons of coal. Illinois coal production will help meet overall demand. Annual Illinois coal production will be between 55 and 60 million tons. Since the Salem Township coal block was not included in prior estimates of Illinois coal reserves, these forecasts of future production are projected to occur whether or not Salem Township is mined. Also, over time, the relevant market area for Illinois coal will continue to be the Midwest and the Southeast United States, with about 70 percent of Illinois coal production being sold out of state.

The future price of coal (similar to that underlying Salem Township) is expected to be about $36 per ton. This means that the market value of Salem Township coal (29 to 33 million tons) will be approximately $1.044 to $1.188 billion. Assuming all of the Salem Township coal will be sold instate, the State of Illinois can expect to receive about $51 to $58 million in sales tax revenues, and Knox County roughly $12 to $15 million, over the life of the mine. If 70 percent of Salem Township coal is sold out of state (the norm for Illinois coal), total state sales tax revenue would be approximately $15 to $18 million, and for Knox County about 4 million dollars. In addition, farm acreage which would be affected by a Salem Township mine produces approximately $1 million worth of crops per year. However, no local or

state sales tax revenues are expected from these crops. All dollar estimates are in constant 1989 dollars.

After production would cease at a Salem Township mine, the Knox County property tax rolls would be depleted at most by roughly $488,238 in equalized assessed valuation (EAV). After the petition area is mined out, in constant 1989 dollars, this would mean an annual permanent loss to Knox County property tax revenue of approximately $30,000. Annual property tax losses would equal (exhaust) the total temporary sales tax gains in approximately 0 to 487 years, with 125 to 146 years being most likely. Afterwards, compared to the present situation, the Knox County property tax rolls would be depleted permanently by about $488, 238 EAV. This would mean a permanent loss of property tax revenues, not offset by any previous gain, of roughly $30,000 per year.

No demand or monetary impact on Knox County social services is anticipated should Salem Township be mined.

With respect to the regional and entire Illinois economy, taking into account the maximum possible loss of the Salem Township cropland, a Salem Township mine would cost roughly one to six jobs. About 10 mining jobs would be added to the economy, but 11 to 16 jobs in other (primarily agricultural) sectors would be eliminated. This would mean that real disposable personal income would decrease by about $20,000 in the immediate region yet increase by approximately $60,000 statewide. Also, state personal income taxes would increase by roughly $30,000 per year (all in constant 1989 dollars). However, if the Rapatee Mine were to close in 30 years, a total of 150 to 240 jobs would be eliminated. Those losses would occur across the board, within mining and nonmining sectors alike. Also, about $2.75 to

$5.75 million in real disposable income per year and $260,000 to $1.4 million in annual state income taxes would be lost (again, all in constant 1989 dollars).

CHAPTER XI

IMPACTS OF MINING

A. INTRODUCTION

The preceding chapters are intended to provide a comprehensive current and historical description of the physical, cultural and socioeconomic characteristics of the Salem Township of Knox County Petition Area and surrounding vicinity. Such a description places the petition area in its regional context, establishing a framework for assessing local and regional conditions in the absence of a coal mine in the area. It is also necessary to understand the present situation before accurately identifying the environmental and socioeconomic impacts if coal mining were to take place in the petition area.

This chapter draws from information collected and provided in Chapter III through X to evaluate the impacts that may be expected if surface coal mining takes place in the petition area. The discussion is arranged by discipline (i.e., geology, atmospheric, water, etc.) in the same sequence as presented in this volume. Section XE -- Economic Issues contains a detailed analysis of potential economic impacts of mining the petition area. Hence those particular economic issues need no further elaboration.

B. IMPACTS ON GEOLOGICAL RESOURCES

Coal Extraction

Surface coal mining could produce approximately 24.28 million tons of the Springfield Coal and 8.95 million tons of the Herrin Coal from within the boundaries of the petition area. The Danville Coal is also present over a small areal

extent in the proposed mining area, but not thick enough to warrant mining under existing economic conditions. The Colchester Coal is present at depth, but is considered too deep for current economical surface mining in the area.

Processing Wastes

Coal mining at the petition area will produce processing waste consisting of rock fragments, minerals from the coal, such as pyrite or sphalerite, and unrecoverable coal. This refuse is likely to have a high sulfur content and will need to be disposed of using environmentally sound techniques. Future coal processing by Mid State Coal Company would be done at the existing processing plant at the Rapatee Mine. Waste products would be deposited near that facility. It is not known what processing and disposal methods would be employed by other companies.

Water for Coal Processing

Coal processing, fire protection, dust control, sanitation and reclamation activities are coal operations which require water. Coal processing requires the most. Water exits the processing plant carrying sediment and dissolved minerals. Most processing plants use a closed circuit of settling ponds to best facilitate the control and correction of water quality. Water for processing, if obtained from surface or groundwater supplies at the Rapatee Mine, should not affect the quality or quantity of water in the petition area.

Petroleum

The petition area is located outside the areas of active petroleum production in Illinois and does not overlie any known petroleum reserves.

Sand and Gravel

Available data suggests that there are no significant sand and gravel deposits in the petition area and therefore surface coal mining would have no impact.

Clay

There are no significant clay resources in the Modesto or upper Carbondale Formations rocks in the petition area.

Limestone

Limestone is not found in thicknesses sufficient to be considered a resource in the petition area.

Disturbance of Geologic Materials

The geologic materials above the shallowest minable coal seam (the Herrin Coal) consists of glacial deposits, shale, thin claystone, limestone and sandstone units, and some sand and gravel. Geologic materials above the Springfield Coal, the deeper minable seam in the petition area, consists predominantly of shale with some thin claystone, limestone and sandstone.

The disturbance of these materials will alter their water-conducting properties which will result in exposure of the material to weathering processes that can alter naturally occurring minerals and may accelerate the release of weathering products into the near-surface groundwater (Lindorff et al. 1981). Proper reclamation techniques and handling of pyritic materials can limit such effects. However, the geology of the site must be thoroughly characterized if the mining impact on geologic materials and groundwater is to be properly evaluated (Lindorff et al. 1981). Present information on the geology and mineral constituents of the geologic units is inadequate, especially in the absence of a specific mine plan, to predict the consequences of mining disturbance of overburden materials in the petition area.

Disruption of Aquifers

Mining may have significant impacts on shallow groundwater flow by disrupting shallow (less than about 140 feet) geologic formations above the Springfield (No. 5) Coal in the petition area. Deeper aquifers, the Mississippian limestones and older Ordovician sandstones would not be significantly impacted by mining.

Data from over 500 coal test borings in the petition area and vicinity indicate the presence of sand and gravel deposits in the drift but the distribution of these deposits cannot be mapped from the uneven distribution of available well information. It appears likely that these deposits have restricted extent, occurring in areas of a few hundred acres or less and separated laterally from adjacent sand bodies by hundreds to thousands of feet. Thicknesses of these deposits range from a few feet to as much as 30 to 40 feet, thinner sands being more common.

The topography of the area and the distribution of the drift sands (to the extent the distribution can be determined) suggest that groundwater recharge is local from infiltration through overlying and upslope drift. Sand deposits that occur beneath the lower parts of the landscape near West Fork Kickapoo Creek may carry groundwater discharge from underlying rock units.

The sand and gravel deposits, which occur within the petition site, are thin, isolated deposits which yield very little water. Available information suggests that these deposits do supply small quantities of groundwater for domestic use within and around the petition site. Mining of this area will disrupt these aquifers and reclamation will alter the water-conducting properties of the materials. The hydraulic conductivity will increase due to mining as will the transmissivity (Cartwright and Hunt 1981). This suggests that the water resources of the spoil materials in comparison to the premining unconsolidated materials will probably remain constant or be more available; however, water quality may be degraded (Lindorff et al. 1981). The three sites studied by Lindorff et al. were mined prior to the enactment of reclamation laws in Illinois. He states, that "Reclamation of the sites, including proper handling of pyritic material to minimize oxidation, would probably have reduced adverse impacts on ground and surface waters."

Currently used bedrock aquifers (identified by the wells of record) will probably not be disturbed by surface mining; however, thin, discontinuous water-yielding horizons in the uppermost part of the shallow bedrock, i.e., the upper part of the Pennsylvanian lying above the shallowest completion of record in the Pennsylvanian, may be disturbed by mining activity.

Geologic Hazards

The presence of underground mine workings in the petition area makes mine subsidence a possibility in those areas where the Springfield (No. 5) Coal has been mined. This occurs in the southern part of sections 34 and 35, T-9-N, R-4-E (Map 23).

The geologic setting of the petition area does not present other geologic hazards.

C. IMPACTS ON ATMOSPHERIC RESOURCES

Climate

The impacts on climate following a decision that a given area is no longer suitable for mining are minimal. The major causes of climate (e.g., the sun, latitude of the site, advection of air masses, and distance from large bodies of water) remain unchanged. The only impacts to climate would be those which are directly related to changes in the micro-topography and changes in the radiation balance of the mined or reclaimed area.

Changed topography might change wind direction and speed from conditions prior to mining. However, changes to the wind would be virtually indeterminate, because the scale of change would be so small. Wind directions might be changed 5° or so in direction, and perhaps the speed would be increased or decreased by a few miles per hour at some times, but changes of these scales are not significant to the local climatology.

The solar radiation budget might be increased or decreased, depending on whether the local albedo (reflectivity) has been decreased or increased. If solar input to the surface were increased, there would be a tendency for increased temperature in that area. Because of the wind, temperature changes would quickly be distributed to surrounding areas and in all likelihood would be immeasurable. Although precipitation is sensitive to atmospheric stability, and stability is sensitive to surface temperature, changes in precipitation would also be insignificant because the temperature changes would be so small.

Because the area of impact is small relative to its surroundings, it is doubtful that any changes to local atmospheric resources would be noted.

Air Quality

In the portions of a surface-mine without vegetative cover, winds of sufficient strength may erode particles from bare, dry soil surfaces and raise them into the air. This has two impacts on atmospheric resources: concentrations of airborne suspended particulate matter are increased, and visibility is decreased.

Concentrations of suspended particulate matter could well be increased by wind erosion of exposed soil and by dust generated from various mining operations, such as topsoil removal, heavy equipment operations and hauling. The amounts of soil dust blown into the air during wind erosion of soil depend upon wind speed, soil type, and soil moisture conditions. The amounts of dust generated during mining operations depend on the specific parameters of the operations. These parameters include volume, silt content, moisture content of the topsoil or coal removed, and the number of hours of equipment operations. Amounts of dust generated by vehicle

travel on unpaved roads depend on vehicle miles traveled by trucks, silt content of the road surface, vehicle speed and weight, number of wheels per vehicle, and the number of days per year without precipitation. Dust generation on haulage roads and work areas can be reduced by regular spraying. Since many of these parameters have not been specified for the petition area, it is not possible to estimate quantitatively the effects on airborne dust concentrations. However, we estimate that visibility could be severely reduced under conditions of high wind speeds and dry, bare soils. The area affected by this severely reduced visibility would be restricted to only a few hundred feet downwind of the area of active emissions. Beyond that point, the plume of blowing dust might be visible downwind to distances of a mile or more, but visibility would be largely unaffected.

D. IMPACTS ON WATER RESOURCES

Groundwater

This portion of the report presents the principles of groundwater hydrology applicable to the assessment of the impact of mining on the groundwater environment of the petition area.

Several factors influence the potential impacts of surface mining within the petition area. For this reason, the groundwater discussion is divided into five parts: 1) impacts on geohydrologic flow parameters, 2) changes in groundwater recharge, 3) changes in groundwater flow patterns, 4) impacts on groundwater quality, and 5) impacts on present and future water supply development.

Impacts on Geohydrologic Flow Parameters

Groundwater hydrology may be defined as the science of the occurrence, distribution, and movement of water below the surface of the earth. Geohydrology has an identical connotation (Todd 1980). To this end, this description will concentrate upon hydrologic principles associated with surface mining practices and the impacts on this environment that may result from these practices.

Of all the mining methods, surface mining physically disrupts the largest amount of geologic materials because it requires the excavation of soil and other material (referred to as overburden) that overlies the coal (National Research Council 1981). As a result, the impacts on the flow parameters within the unconsolidated and shallow bedrock aquifers (less than 150 feet) will be characterized. The impacts on the deeper aquifer systems are estimated to be relatively minor.

Two phases of surface mining may affect the groundwater environment within an area: 1) the actual mining process, and 2) the post-mining or reclamation phase. The geohydrologic flow parameters will ultimately be impacted by the post-mining or reclamation phase of mining. To this end, this discussion will concentrate upon this phase of the surface mining process. (For a more detailed discussion of the flow patterns during mining, see the Changes in Groundwater Flow Patterns portion of this section.)

Under the Illinois Surface Coal Mining Land Conservation and Reclamation Act (PA81-1015), a surface mine area is dictated to be returned to premining conditions. The premining geologic characteristics of this site are detailed in Chapter III - Geologic Resources (Section A). Generally, water well records in and around the site

(Appendices B and C) indicate an overlying glacial drift ranging from approximately 40 to 70 feet deep. This drift is composed of interbedded clays, silts, and sands deposited by glacial episodes. The well records also indicate that some households within the petition site use the thin sand and gravel formations within the drift for a domestic water supply. These supplies rely upon slow seepage of groundwater into a bored type well. (See Impacts on Present and Future Water Supply Development in this section for a more detailed description of bored wells.) As previously indicated, these deposits will be the most impacted by the reclamation of this area and will be the focus of this discussion.

When mining ceases and reclamation begins, the composition of the replacement materials (or spoil) determines the groundwater hydraulics in the reclaimed area (Gibb and Evans 1978). Impacts associated with the reclamation result from hydraulic parameters which differ from those of premining conditions. Several geohydrologic characteristics have a high potential for impacts from surface mining practices. Those which are most important in terms of groundwater availability are the hydraulic conductivity, the transmissivity, and the porosity of the resultant aquifer or spoil.

The hydraulic conductivity is generally defined as the capacity of a porous medium to transmit water (Driscoll 1986). The hydraulic conductivity is a function of the size and shape of the pores of geologic material, the interconnection between pores, and the physical properties of the fluid which travels through the pores. In general, for unconsolidated porous media, hydraulic conductivity varies with particle size: clayey materials exhibit low values of hydraulic conductivity, whereas sands and gravels display high values (Todd 1980). It is unlikely that hydraulic conductivities of spoils

in any mine will be the same as those of the pre-existing materials (National Research Council 1981).

Several scientific studies have been conducted to characterize the impacts on hydraulic conductivity associated with surface mining. The National Research Council (1981) states that "if the spoil is not predominately shale, a large increase in hydraulic conductivity occurs." This implies that the hydraulic conductivity of the reclaimed land is dependent upon the materials which make up the spoil. The increase or decrease in hydraulic conductivity is a factor of the percent of the materials that have a low hydraulic conductivity (i.e., clays and shales) within the spoil. Cartwright and Hunt (1981) indicate that a mine spoil generally consists primarily of blocks of tills and shales with smaller amounts of sandstones and limestones, and drift sand and gravel. They also indicate that this spoil resembles a "man-made aquifer" and may induce a higher hydraulic conductivity in relation to the original undisturbed material as a result of this characteristic.

Only information from the surrounding area is available to characterize the petition area in terms of hydraulic conductivity. Midland Coal Company used slug testing to derive glacial drift conductivities in three surrounding mine areas (Elm, Mecco, and Rapatee mines) prior to mining. (A slug test is a hydraulic test in which a slug of water is added to or removed from a well very quickly. The water level response is measured over time until the water level in the borehole becomes equilibrated. The hydraulic conductivity can then be calculated from these measurements.) The values of hydraulic conductivity ranged from 0.30 to 9.05 gallons/day/square ft (gpd/ft^2). The hydraulic conductivities calculated from mine spoil material from two mines, the Captain and Streamline, in southwestern Illinois were calculated to be 0.98 and 447 gpd/ft^2, respectively (Oertel 1980). This would imply that the hydraulic

conductivities of the spoil material may increase by a factor of more than 50 times the value of the undisturbed material, or may be very similar to or even less than that of the undisturbed glacial material. Another study conducted on several mines in Indiana, Illinois and Kentucky provided similar results in that the range of hydraulic conductivity values for spoil materials was from 0.98 to 1,005 gpd/ft^2 (Herring 1981). Again, this indicates that the composition of the spoil material will have a large influence upon the hydraulic conductivities of the "man-made" aquifer after reclamation.

Another closely related geohydrologic flow parameter which would be impacted by surface mining practices (along with the hydraulic conductivity) is the transmissivity. Transmissivity is defined as the measure of the amount of water that can be transmitted horizontally through the unit width of an aquifer under a unit hydraulic gradient (Fetter 1980). It can be calculated as the product of the hydraulic conductivity and the saturated thickness of the aquifer (the depth range in an aquifer through which groundwater is found). In the worst-case situation in which hydraulic conductivity values decrease in a "spoil aquifer," it is likely that the saturated thickness of the area will increase as a result of the surface mining of the shallow bedrock for the coal. This would suggest that the transmissivity could remain relatively constant in this situation. However, if the hydraulic conductivity were to increase, the saturated thickness would most likely also increase (because of mining of the bedrock), and this situation would induce a corresponding increase in transmissivity.

The transmissivity is the hydraulic property which governs the transport of water to a discharge point (well, spring or creek). Thus, if this factor is altered, the availability of groundwater or the ability of the aquifer to transmit groundwater to a well will be

impacted. Two important properties that could also influence this ability are the porosity and specific yield of the materials used for reclamation.

The porosity is expressed as the ratio of the pore space volume to the total volume of the formation and represents an index of how much groundwater can be stored in a saturated medium (Driscoll 1986). Although the volume of groundwater within the aquifer material is a concern, the amount of groundwater which is released from storage is ultimately the most important variable. The term for this capability is specific yield. The specific yield of an aquifer is the sum of the drainable porosity and the compressive storage of the aquifer material (Driscoll 1986). Materials such as clay and shale will produce a lower specific yield within an aquifer. The volume of these materials within the spoil will affect the specific yield of the reclaimed area. Thus, more water may be contained within the spoil aquifer but may not necessarily be more readily available.

In summary, surface mining of an area will impact the geohydrologic flow characteristics of the area. Several studies indicate that the impacts to the geohydrologic properties due to mining may result in either increases or decreases in the groundwater availability at a site. These studies also indicate that the geohydrologic flow characteristics may even remain very similar to those of premining conditions. The determining factor will be the geologic makeup of the spoil material which will be used for reclamation. The extent of this impact can be determined only by post-mining testing.

Changes in Groundwater Recharge

The major sources of recharge to aquifers in Illinois are direct precipitation on intake areas and downward percolation of stream runoff (induced infiltration). Because recharge is derived from precipitation, it is irregularly distributed in time and place. It occurs primarily during the spring months when evapotranspiration is small and soil moisture is maintained at or above field capacity by frequent rains (Walton 1965). Several factors affect recharge rates, such as surface relief, antecedent moisture conditions, precipitation amount and intensity, land use patterns, vegetative cover, evapotranspiration rates, and the hydraulic properties of the geologic materials through which the water flows. However, because recharge involves the downward percolation of water, the effects on groundwater recharge of the petition area will be most directly influenced by the hydraulic properties associated with the site reclamation.

Generally, recharge is the addition of water to a zone of saturation which involves the vertical movement of water or leakage through geologic deposits. The quantity of vertical leakage varies from place to place and is controlled by the vertical hydraulic conductivity and thickness of the deposits through which leakage occurs, the head differential between sources of water and the aquifer, and the area through which leakage occurs (Walton 1965).

There are two zones within the petition site where the recharge may be affected by surface mining. The first is the shallow unconsolidated materials which will consist of mine spoil after reclamation. The second is the shallow Pennsylvanian bedrock which underlies the drift.

The impacts on both zones associated with surface mining will be directly dependent on the geologic properties associated with the mine spoil. As discussed in the Impacts on Geohydrologic Flow Parameters portion of this section, the hydraulic conductivities of this area could increase when the mine spoil is used for reclamation. Because the vertical leakage is related to this hydrologic principle, it too would be increased within the mine spoil. If, on the other hand, the mine spoil has a high shale and clay composition, this might suggest a decreased conductivity and thus the recharge would be negatively affected. (The hydraulic conductivity values of an aquifer will typically represent the horizontal flow of groundwater within that aquifer. However, because the horizontal and vertical flows are hydraulically related, the principle of related effects is applicable.)

In most situations, mine spoil aquifers transmit groundwater at least as readily as the strata replaced, thus acting more as conduits than as barriers to groundwater flow. If hydraulic conductivity values increase as a result of the spoil aquifer, the impacts of increased transmission of water are expected to be beneficial, except where groundwater of undesirable quality is generated (National Research Council 1981).

The recharge to the shallow Pennsylvanian bedrock at the petition site will be dependent upon the vertical infiltration of groundwater through the mine spoil. As mentioned, this spoil aquifer will typically transmit water as easily as the drift it has replaced. However, because the formations directly below the spoil will most likely consist of relatively impermeable shales, any change of recharge through the spoils would be relatively insignificant to the bedrock below. This is further exemplified by the records of domestic water wells within the petition area (Appendix B). These records indicate that the shallow sandstone aquifer is not typically used in this area for water supplies. The deeper limestone formations (greater than 350 feet) are the

principal water-yielding formations for domestic bedrock supplies in this area. Because of the southeasterly dip of these rocks (Wanless 1957), it is more likely that they are being recharged to the northwest of this site where they come to (or near) the surface. This fact suggests that even if the vertical hydraulic conductivity increases within the mine spoil aquifer, the recharge to the bedrock wells which exist in the petition area will not be significantly impacted by the changes in recharge due to surface mining.

Changes in Groundwater Flow Patterns

Available information indicates that several natural hydrologic features would influence shallow flow regimes at the site. Flow patterns from the central portion of the site will extend in the direction of the West Fork of Kickapoo Creek on the east and northeast sides of the petition area. Shallow groundwater will flow and discharge in this direction. In the south-central and south areas of the petition site, elevational highs will dictate groundwater flow. These highs will become local recharge areas for shallow groundwater and may create local discharge areas at the bases of the high (See Figure V-1). Post-mining conditions should follow these principles when the reclamation is complete.

The mining process will temporarily alter these flow patterns. When mining begins, flow patterns will be in the direction of the mined areas. Typically some type of dewatering system will be used during the mining process which will create a local cone of depression at the source and induce flow towards it. This will create water-level declines near the dewatering; however, these declines will typically not radiate more than 300 to 1000 feet in advance of the surface mine pits (Oertel 1978).

Once surface mining operations have been completed, changes in groundwater quantity usually develop. The changes result from the alteration of the geohydrologic characteristics of the area (Cartwright et al. 1981). As discussed in previous portions of this section, a mine spoil aquifer will be created. In a regional context, this whole area could act as a high groundwater flow-through area if increased hydraulic conductivities of the spoil aquifer exist. This would allow a greater availability of groundwater to wells finished within these materials.

In summary, if the petition site is surface-mined, local groundwater flow patterns will be temporarily affected. The extent and duration of this effect would depend upon the specific topographic and geologic configuration of the site after reclamation.

Impacts on Groundwater Quality

The groundwater quality of surface-mined lands is dependent upon such factors as the premining ambient water quality; the ambient groundwater quality in adjacent, hydraulically connected areas; the acid-production potential of the geologic materials; the buffering capacity of the geologic materials; the period of time after mining; and mining and reclamation practices. Groundwater quality data for the shallow unconsolidated materials (Table XI-1) are assumed to be representative of ambient water quality. The chemicals that occur in degraded water, as well as the geochemical processes involved in the degradation of water, are generally the same in uncontaminated and unmined areas, respectively (National Research Council 1981). However, the potential to alter those processes and ultimately the water quality is increased by surface mining.

TABLE XI-1

WATER QUALITY CHARACTERISTICS OF GROUNDWATER IN DOMESTIC
IN AND AROUND THE PETITION AREA

Date and location	Depth (feet)	Iron (total) Fe	Turbidity	Color	Odor	Chloride Cl	Alkalinity (as $CACO^3$) P	M	Total hardness (as $CACO_3$)	Dissolved minerals
1/30/40 T.9N., R.4E., Section 11	1302	0.2	5.0	0.0	0.0	1480.0	0.0	834.0	55.5	--
2/10/40 T.9N., R.4E., Section 11	67	0.3	4.0	0.0	0.0	78.0	0.0	404.0	634.0	--
4/22/64 T.9N., R.4E., Section 11	1580	1.0	13.0	0.0	0.0	245.0	0.0	228.0	424.0	1619.0
2/20/40 Lot 16, Block 11, Section 13	90	0.1	trace	0.0	0.0	29.0	0.0	348.0	661.0	--
2/21/40 T.9N., R.4E., Section 3	10	1.6	48.0	55.0	M-3	0.0	0.0	100.0	121.0	
5/6/49 T.9N., R.4E., Section 2	40	0.4	15.0	0.0	0.0	13.0	0.0	242.0	338.0	--
1/26/66 T.9N., R.4E., Section 15	465	1.1	5.0	0.0	0.0	590.0	0.0	1040.0	24.0	2084.0
7/14/83 T.9N., R.4E., Section 36	35	0.18	2.0	< 1	musty	29.0	0.0	254.0	460.0	590.0

Acid production in surface-mined lands largely depends on the amount of pyrite (FeS_2) in the disturbed materials. Pyrite, when oxidized, is a strong acid producer. When geologic materials containing pyrite are disturbed and exposed to air (oxygen) and water, pyrite and iron oxidize to form iron (Fe^{2+} or Fe^{3+}), sulfate ($SO_4{}^{2-}$), and hydrogen ($H+$) ions. Thus, iron and sulfate concentrations are increased. In response to an increase in the hydrogen ion concentration (acid production), other reactions will occur which further increase the dissolved mineral content of the groundwater. Additionally, trace metals in the disturbed materials (lead, copper, nickel, zinc, and cadmium, for example) can be released in measurable quantities. Degradation of groundwater quality through pyrite oxidation can be mitigated if sufficient buffering materials are present. The buffering capacity refers to the ability of the aquifer system to neutralize acid production and primarily depends upon the availability of carbonate ($CO_3{}^{2-}$) and bicarbonate (HCO_{2-}) ions in calcareous geologic materials.

In an examination of water quality of 12 final-cut lakes in Illinois, Gibb and Evans (1978) found the quality in ten to be unsatisfactory for drinking purposes. Of the constituents they listed, those which most frequently exceeded drinking water standards were total dissolved minerals, sulfate, manganese, lead, and cadmium. Total dissolved minerals, sulfate, and manganese are not usually toxic; limits for lead and cadmium (and other trace metals) which are potentially toxic, are based on limits of toxicity. Water in all 12 final-cut lakes was judged to be of acceptable quality for livestock.

Concentrations of nitrate generally tend to be widely variable, depending on the proximity to pollution sources (feedlots, septic tanks, etc.). Consequently, the levels of nitrate which would be found after mining ceases would depend upon local conditions with regard to pollution sources. Nitrates generally appear to be

unaffected by mining. It must be noted, however, that this study was conducted upon final-cut lakes that were mined in pre-regulation periods. It would be expected that the present mining regulations would help decrease the chance of poor water quality after reclamation.

Gibb and Evans (1978) also found that concentrations of sulfate and total dissolved minerals are elevated by mining activities. One interesting finding was that there appears to be some decrease in concentrations with time in some instances. This decrease is believed to be due to mixing of the groundwater with water from other sources (i.e., flow from local recharge areas and precipitation), and to a flushing of the aquifer by discharge to a river or stream system. This effect would be seen to some degree for all mobile constituents; however, its magnitude would depend upon the reclamation of the site. Information supplied by the Midland Coal Company seems to indicate the opposite situation in terms of groundwater quality from sampled wells over a long period of time. Table XI-2 lists water quality information and the date mined for three local mines (Elm, Mecco and Rapatee) near the petition area. It is apparent from these data that the degradation of groundwater quality will occur as a result of surface mining. However, the specifics concerning those materials from which groundwater was sampled are not available. It is apparent that these analyses were conducted on samples from material which had no required mining or reclamation regulations. Some of those samples do indicate water of acceptable quality for some purposes. Present reclamation requirements may result in similar conditions that Gibb and Evans (1978) observed (i.e. a decrease in chemical concentrations over time).

Table XI-3 indicates water quality parameters analyzed by the Midland Coal Company within the surrounding area of the petition site. Monitoring wells from the

TABLE XI-2

MIDLAND COAL COMPANY
WATER QUALITY DATA

Date mined	pH	ALK.	TDS	SO_4	Fe	Mn	Ca	Mg	Na	Cl	Well Type
1980	7.1	274	680	236	0.16	0.27	108	44	28	17	A & B Hor. replaced E-1B New Spoil
1979	7.3	221	572	179	0.09	0.18	105	27	11	11	A & B Hor. replaced M-3B New Spoil
1976	7.4	107	1311	803	3.14	0.49	136	81	76	18	E-7 Recent Spoil Topsoil
1976	7.2	312	1377	638	3.60	0.19	176	45	85	22	R-4B Recent Spoil No Topsoil
1969	7.1	369	1749	1035	2.61	0.57	251	240	29	5	E-3 Old Spoil
1937	7.0	335	1654	689	3.38	1.70	202	143	30	6	R-9 Old Spoil

TABLE XI-3

MIDLAND COAL COMPANY

WATER QUALITY DATA

No. wells	pH	ALK.	TDS	SO_4	Fe	Mn	Ca	Mg	Na	Cl	Well Type
10	7.6	182	288	52	0.63	0.18	47	30	14	13	Virgin Land
4	7.4	302	388	43	0.28	0.22	62	24	43	9	Virgin Land Adj. To Mined Area
2	7.0	576	1690	662	2.80	0.56	173	188	53	7	Mined Land Adj. To Mined Area
6	7.2	269	1198	577	2.22	0.58	158	100	43	14	Mine Spoil
1	7.6	170	293	59	0.32	0.11	53	42	18	7	(10 Analyses) E-1 Premining
1	7.1	274	680	236	0.16	0.27	108	44	28	17	(11 Analyses) E-1B Postmining Spoil
1	7.5	204	384	65	0.44	--	88	--	14	21	(5 Analyses) M-3 Premining
1	7.3	221	572	179	0.09	0.18	105	27	11	11	(14 Analyses) M-3B Postmining Spoil
1	7.5	482	518	10	0.12	0.05	33	25	126	10	R-10 Adjacent down-gradient well to mined spoil.

three aforementioned mine sites are listed. The exact depths and locations of each well are unknown; however, a short description of the well type is included. A premining and post-mining analysis is included for two of the three sites. Generally, these analyses indicate that post-mining groundwater within the spoil material has elevated concentrations of mobile constituents (iron, chloride, etc.), elevated levels of total dissolved minerals (TDM), and lowered pH values (more acidic). These elevated levels, however, do not necessarily indicate that the water is unusable for all purposes.

This information also implies that groundwater quality in areas adjacent to a mined area may be impacted by mining. Water quality is described for virgin land, virgin land adjacent to a mine, mined land adjacent to a mined area, and a mined spoil. These data indicate that the poorest groundwater quality is found within the mined land adjacent to a mined area. This may be attributable to the impacts of both the flow from the adjacent mine and the mining at this particular site. This conclusion is speculative, however, because of the lack of more detailed information concerning the wells.

Water quality at this site may also be affected by the processing techniques used for the coal. If the coal were to be processed off-site, the potential acid production from pyrite oxidation would be significantly decreased. As mentioned, this waste has the highest concentration of pyrite. Because the mining processing techniques are unknown, the potential for water quality degradation due to processing is speculative. Also, the exact pyrite concentration of shale units overlying the coal are unknown at this time. It is likely that some acid production and subsequent water quality degradation will result from mining despite efforts to minimize this impact. As mentioned, however, the relative degree of this degradation is unknown.

Table XI-1 summarizes water quality information analyzed from domestic water wells finished at various depths in and around the petition area. The water quality of the bedrock aquifers of this area would be less likely to be affected by surface mining than that of the shallow unconsolidated spoil materials. The mining process may produce some vertical flow gradients to the upper Pennsylvanian bedrock; however, the number and magnitude of influence of these gradients will be dependent upon its geologic makeup and the mining processes used. Although we have no record of this uppermost bedrock being used for domestic water supplies within the petition area, its water quality may be affected. The degree of this effect will depend upon the chemical makeup and the buffering capacities of the spoil.

The deeper limestone aquifers which are being used for domestic water supplies in this area appear to be protected by deep and thick sandstone and shale units. The water quality of these limestone formations will depend mostly upon the chemical composition of those units and those directly surrounding them, rather than on infiltration of shallow subsurface groundwater located directly above them. These formations will typically have a slight tilt where recharge will occur where they come near the surface. Available information indicates that these recharge areas will be located in an area northwest of the petition site (Student et al. 1981). The water quality of these units will be more directly dependent upon the water quality of the local area where these units come close to the surface.

In summary, available information suggests that the quality of groundwater in the resultant spoil aquifer within the petition area would be adversely affected by surface mining. Based on a comparison with available data, those constituents most likely to be adversely impacted are total dissolved minerals and sulfate. Concentrations of

iron and alkalinity would be altered and elevated concentrations of trace metals could also be present. It is also likely that the hardness of the groundwater after reclamation would elevate because of the increased opportunity of calcium and magnesium to dissolve into solution. These are the primary chemical components and cause for increased hardness in water.

Impacts on Present and Future Water Supply Development

A number of factors influence the impact of mining on present and future water supply development from the unconsolidated materials within the petition area. Among these are the mining and reclamation plans; the geohydrology (flow parameters, flow patterns, and water quality); and the location of present and future demand. These factors will be considered in evaluating the impact on water supply development during the hypothetical mining and post-mining phases in the petition area.

Because surface mining physically disrupts the geologic materials overlying the coal by excavation, large pits are created which change the configuration of the local water table (that surface in an unconfined water body in which the pressure is atmospheric). The site becomes a new local discharge point, and groundwater flows toward it. Because of this effect, the mine will usually require dewatering. The effect of this dewatering on nearby wells depends upon the hydrogeologic properties of the materials being drained (Cartwright et al. 1981). Cartwright and Hunt (1981) describe a situation where the effect of the highwall/dewatering condition will typically impact only a very local area near it. This is due to the lower hydraulic conductivity values associated with the tills and shales, which typically exist in areas where mining is suitable. There does exist the possibility that all areas within the

immediate surrounding area of the petition site would be partially dewatered as a result of dewatering activities during mining. Again, this would depend upon the hydraulic properties of the drift materials, the locational extent of the mining, and the specific mining practices used.

The impact of the mining dewatering would be the probable dewatering of shallow domestic large-diameter bored wells which lie in the local area of the dewatering. A bored well taps stringers or lenses of silt, sand or gravel only a few inches thick contained in the unconsolidated materials above bedrock. The water levels fluctuate seasonally in response to the variations in precipitation and are limited to only a few hundred gallons of water a day. Dewatering for mining may decrease the availability of water for this type of well depending upon its location relative to the mining. The Water Survey has records of only one large-diameter bored well located within the petition area (Terrell, Appendix B; also Map 21 Well Locations). A reliable source of water to supply this domestic demand during mining could be secured by using the deeper bedrock sources which exist in this area. However, because these sources have a poorer quality groundwater associated with them (Table XI-1), a commercially available water treatment system may be necessary.

There are two records of small-diameter drilled domestic wells tapping the underlying bedrock formations within the petition area (Cooper, Rogers - Appendix B; Map 21 Well Locations). These wells have been drilled to depths of 465 ft and 390 ft and are finished within limestone formations. A small-diameter drilled well relies on the number and degree of interconnection of the crevices and/or solution channels intersected by the borehole. Based upon available information, it is expected that these wells will not be impacted by dewatering of the unconsolidated materials during mining.

In the reclamation phase, the flow patterns of groundwater are expected to return to their approximate premining levels, particularly in the unmined areas (National Research Council 1981). As presented in the discussion of flow patterns, this expectation is dependent upon the specific features at the site after reclamation. The above-mentioned wells are the only recorded bedrock wells that would potentially be dewatered during the mining phase. However, this is highly unlikely because of their depth. Municipal wells located in this area (Appendix C) all fall outside the petition area and would not be expected to be influenced by mining in this area.

Within the mined areas, the changes in hydraulic conductivity and saturated thickness imply that there may be more water in storage after mining than before. Whether this water will be readily available will be dependent upon the geologic makeup of the spoil material. This fact may be of little consequence, however, because the quality of shallow groundwater in the affected area might not meet drinking water standards after reclamation. Comparisons of Tables XI-1, XI-2 and XI-3 indicate that the water quality of the spoil aquifer created by the mining process will most likely be poor (but still usable) in relation to that in unmined areas. These tables also indicate that the areas adjacent to the mine will exhibit similar water qualities. (It must be noted; however, that these analyses were conducted primarily upon preregulation sites.) However, it may be possible that groundwater quality may increase over time in the mined area (Gibb and Evans 1978).

Based upon available topographic information, some areas within and around the proposed mining site have been mined previously. There are records of domestic water supplies located within and around these areas (Appendix B; Map 21 Well Locations). This would indicate that post-mining domestic water demands can be

met through use of either shallow wells finished within the unconsolidated materials, or from bedrock well systems. However, any water quality or quantity problems associated with these wells are not known.

In conclusion, the total area of the aquifer capable of meeting groundwater demand might be reduced, because the mined areas might produce groundwater of insufficient quality (for domestic use) from the large-diameter bored well(s) present in this area. This type of well will also most likely experience a temporary loss of supply as a result of dewatering practices at the mine site. The extent of this loss will depend upon the proximity of the dewatered areas to the well. Available information pertaining to the small-diameter drilled wells finished within the bedrock of this area suggests that effects of the mining and dewatering in terms of water quality and quantity, respectively, will be minimal for these bedrock wells. It appears that this area is likely to be capable of responding to the groundwater demand after reclamation. However, available information also suggests that the groundwater quality of this site after reclamation will be degraded (See Impacts on Groundwater Quality in this section for a more detailed description of groundwater quality of the mined site). The extent of degradation will depend upon the geologic makeup of the spoil, upon the reclamation process used at the site, and upon the intended use of the water. Any impacts associated with water well use in this area is dictated to be handled by the mining company. Under current mining regulations a mining company is required to furnish a comparable (to premining conditions) water supply to any individual impacted by the mining activity.

Surface Water

Hydrologic Effects

The impact of surface-mining on streamflow conditions following the mining activities is affected by three major factors: 1) surface relief and topography; 2) land use patterns; and 3) vegetative cover. Though the potential for change from the original streamflow regime is great, the typical characteristics of streamflow from mined areas in western Illinois are fairly similar to those for pre-mined conditions. This similarity is observed in streamflow records as reported previously in Chapter V (Water Resources). The reestablishment of a vegetative cover, maintenance of major stream courses, and the presence of final-cut lakes appear to be significant factors in maintaining this hydrologic similarity.

Surface-mined areas normally have greater local surface relief than unmined areas. Without sufficient vegetative cover, this increased relief can result in a marked increase in runoff and decreased infiltration into the soil. The evapotranspiration associated with the plant cover is an important factor in reducing the overall yield of surface flow to more normal conditions.

Even with proper vegetative cover, the steeper slopes of mined areas will result in a higher maximum rate of runoff. Final-cut lakes or required detention basins detain stormwater runoff, and in most cases peak discharges are less than the peaks for pre-mined conditions. The Surface Mining Control and Reclamation Act of 1977 requires that runoff not be increased by a 10-year, 24-hour storm. This is a good guideline and will protect against flooding at or below this frequency. Flooding resulting from less frequent events will probably not be significantly impacted by

surface mining. Final-cut lakes may also help in the initial reestablishment of the shallow groundwater table, which in turn may help the establishment of local plant cover. The storage of water in the lakes and surrounding unconsolidated materials is also a likely cause of the increased low-flow conditions frequently observed in mined watersheds.

Flooding

Maps 30 and 82 show the extent of the 100-year floodplain in the petition area and in the three county area. If the petition area is mined, there may be additional local flooding within the petition area due to the removal of vegetation and the resulting increase in runoff as discussed above. Due to the additional storage provided by detention basins that are required to deal with sediment and runoff, however, flood elevations and discharges at the outlet of the mined area are not likely to be significantly different from the premining condition.

Streambed Stability

The main factors impacting bed stability are water velocity, water surface elevation, and the frequency of occurrence of various flows. In an active mine area, temporary slopes and channels may be unstable, but it is expected that required sediment and runoff control structures as well as new vegetation will minimize differences between these flow parameters in the pre and post mining periods. Permanent structures are required to safely pass the peak runoff resulting from the 100-year 24-hour rainfall event.

Erosion and Sediment Yield

Soil erosion is contingent on soil properties, topography (slope and overland flow length), land use/cover, soil conservation practices and climatic factors. The lack of a specific surface mining plan makes a quantitative assessment difficult. Therefore only a qualitative assessment is given.

The removal of surface vegetation for surface mining operations will increase the gross erosion. Maps 45 and 46 show the land use in the three-county and petition areas. Most of the land in the petition area is agricultural. The slope of the petition area and immediate surroundings is moderate, as shown in Maps 47 and 83. The soil map of the petition area is shown in Map 84. Most of the soils of the petition area are Tama, Ipava and Sable. These soils have an erodibility index of 0.32, which is in the moderate range. Removal of vegetation and disturbance would increase erosion from these soils.

Sediment yield is defined as the amount of sediment delivered to the outlet of the watershed. Although there is potential for increased sediment yield, this problem is recognized by the industry and the regulators. All permitted coal mines have detailed plans in place for the control of erosion to limit off-site movement of sediment during both the mining and reclamation phases.

Wetlands

Surface mining in the petition area would alter or destroy existing wetlands, which are mainly surface-mine ponds, in mined areas. This activity would create new

wetlands, probably the palustrine open-water type. In a study conducted in western Pennsylvania, it was found that the area of palustrine wetlands increased after mining, in some cases showing a dramatic increase in the open-water type (Brooks and Hill 1987). The number of wetlands increased more than threefold in mined versus unmined areas (Brooks and Hill 1987). Surface-mine ponds form when areas between spoil banks and final cuts fill with underground water, precipitation, and runoff (Olson 1981, Cross et al. 1985). These ponds are usually linear, steeply sloped, and lack a shallow zone suitable for the establishment of rooted hydrophytic vegetation (Olson 1981, Brooks 1987).

Knowledge about the ecology of constructed wetlands is limited (Olson 1987). A large number of environmental factors determine the nature of a wetland, including water regime, physical and chemical parameters of the water (temperature, pH, etc.), substrate, and basin morphometry (Olson 1987). In a study conducted in southern Illinois, water levels in surface-mine ponds receded from 1 to 2 feet in large ponds and up to 8 feet in small ponds during the summer (Bell 1954); extreme fluctuations in water levels produce conditions which many wetland plant species cannot tolerate (Olson 1981). The acidic conditions which tend to characterize young surface-mine ponds also serve to limit development of wetland biota (Olson 1981). However, in the petition area region, water associated with surface mined areas tends to be neutral or alkaline (Konik 1980). Other parameters which can affect the diversity and abundance of biological communities in surface-mine wetlands are concentrations of minerals, presence of heavy metals, dissolved oxygen levels, and water clarity and color (Olson 1981). Basin shape is cited by some as a major factor determining the biological development of surface-mine wetlands. The steeply sloped sides and limited shallow areas which characterize many surface-mine ponds serve to limit the establishment of vegetation along the margins. Bell (1954) reports that the densities

of submerged and emergent aquatic vegetation in southern Illinois surface-mine ponds indicated a high fertility, but narrow zones favorable for plant growth limited the productivity of the area.

If future surface mining in the area proceeds with the techniques used in the past, the wetlands created will generally not support well-developed biotic communities for some time. The lack of establishment of plant communities which form the base of the food chain and provide habitat for fish and wildlife appears to limit the potential diversity and ecological benefits of newly constructed wetlands.

Surface mine ponds can provide quality fish and wildlife habitat under proper conditions, particularly non-acidic waters with established aquatic invertebrate, algal, and aquatic macrophytic communities (Konik 1980). Higher biological productivity occurs in ponds with higher proportions of littoral (shallow photic) zone (Konik 1980) requirements (feeding, nesting, etc.) for wildlife species (Perkins and Lawrence 1985, Coss et al. 1985). Among recommended reclamation techniques that could maximize potential wetland quality are grading to create large shallow areas, islands, and diverse bottom topography; introduction of wetland plant species; limitations on grazing; and water level manipulation (Coss et al. 1985). Because of the array of benefits provided by wetlands (including storm water protection, groundwater recharge, erosion reduction, water purification, wildlife habitat and recreation) and the potential to replace wetland habitat lost to other land uses, the creation of quality wetlands could be viewed as an asset in the surface mining process (Konik 1980, Klimstra and Nawrot 1982, Coss et al. 1985, Perkins and Lawrence 1985).

Water Quality Impact

The results of analyses of water samples collected on January 5, 1990, from Littlers Creek, Hickory Creek, and Kickapoo Creek are shown in Table XI-4. The waters of these streams, with or without surface-mining activities in their watersheds, are high in alkalinity and have comparable characteristics to those of Sugar Creek in the Court Creek watershed. It should be emphasized that the data presented in Table XI-4 pertains to single samples, whereas the tables in Chapter V, Section B, show long-term average values.

TABLE XI-4

WATER QUALITY CHARACTERISTICS OF SURFACE STREAMS IN KNOX COUNTY

Parameters	Littlers Creek	Hickory Creek	Kickapoo Creek
Turbidity, NTU	25	30	26
pH, units	8.29	7.72	8.02
Alkalinity, mg/L	523	248	319
Total phosphate-P, mg/L	2.00	0.34	0.39
Dissolved phosphate-P, mg/L	1.50	0.03	0.20
Total Kjeldahl nitrogen, mg/L	3.80	4.79	2.46
Total ammonia-N, mg/L	1.60	1.19	1.08
Dissolved ammonia-N, mg/L	1.56	0.63	0.95
Nitrate-N, mg/L	0.55	0.44	0.82
Gooch suspended solids, mg/L	33	37	104

Note: Sample date - January 5, 1990

Water quality impacts from mining operations on Littlers and Kickapoo Creeks should not be significant following reclamation if the limestone overburden is present

at the proposed site as it is at Court Creek. The high alkalinity and pH values for Littlers Creek indicate that the limestone overburden is present.

E. IMPACTS ON SOIL RESOURCES

Surface mining of the petition area could potentially impact the soil resources in several ways which have been alleged by the petitioners. Two major points will be addressed individually from the soils perspective: impacts to prime farmland and high capability soils and capability of soils for reclamation.

Impacts to Prime Farmland and High Capability Soils

The petitioners ask that the petition area be designated unsuitable for surface mining under 62 Ill. Adm. Code 1762.11. This section states that the petition area "shall be designated unsuitable for all or certain types of surface coal mining operation" if its reclamation is not technologically and economically feasible under the Surface Coal Mining Land Conservation and Reclamation Act. It is assumed that any coal company operating in this region will be using the best technology currently available. Best technology currently available is defined by 62 Ill. Adm. Code 1701.App.A. Set forth here in part it includes "equipment, devices, systems, methods, or techniques which ... are currently available anywhere as determined by the Department, even if they are not in routine use".

Pertaining to soils, the petition raises these issues:

1. The petitioners doubt that petition soils, particularly Tama, Ipava and Sable soils, can "be restored in a timely manner to a condition capable of supporting: The uses which they were capable of supporting prior to any mining" (62 Ill. Adm. Code 1816.133; part of the Permanent Program Performance Standards).

2. The petitioners also question the ability of operators in the petition area to meet the special requirements for reclamation of prime farmland outlined in 62 Ill. Adm. Code 1785.17(e) and Part 1823 of the same title, over and above the performance standard discussed in Issue 1.

3. The petitioners, therefore, want the area designated unsuitable for surface coal mining because they believe mining will "affect renewable resource lands in which the operations could result in a substantial loss or reduction of productivity of ... food or fiber products" (62 Ill. Adm. Code 1762.11(b)(3)).

Surface mining of prime farmlands and subsequent reclamation of those soils are therefore central to the issues of the petition. Prime farmland is land that meets the criteria set forth by the U.S. Soil Conservation Service and these criteria are described in Chapter VI. Special requirements for issuance of permits to surface mine prime farmland areas are outlined in 62 Ill. Adm. Code 1785.17, and special requirements for soils removal, stockpiling, replacement and revegetation are discussed in Part 1823 of the same title. Soils that do not meet the standards of prime farmland, but are of high productivity for row crops, are called high capability land.

These soils also have separate rules and regulations that are different in both soil reconstruction and productivity standards (less stringent) than those for prime farmland. High capability soils are defined in 62 Ill. Adm. Code 1701. App.A as (paraphrasing) land other than prime farmland which the regulatory authority determines: 1) is capable of being reclaimed for row crop agriculture purposes, 2) is suited for row crop agricultural purposes based on U.S. Department of Agriculture Soil Conservation Service soil survey classifications of land prior to mining, and 3) has optimum future use for row crop agricultural uses. A working definition of high capability soils are those non-prime farmland soils with land capability classes I, II and III, and capability class IV with slopes of 5 percent or less (excludes IVe). Special performance requirements for reclaiming high capability soils are outlined in Part 1825 of 62 Ill. Adm. Code.

The rules and regulations embodied in 62 Ill. Adm. Code pertaining to surface coal mining and reclamation operations have evolved following litigation challenging aspects of the Surface Mining Control and Reclamation Act of 1977. Of particular interest to this petition are those dealing with prime farmlands. Interstate Mining Compact, in their COALEX Significant Issue Report 51, 1985, summarized the legislative history of the prime farmland provisions. A central issue of the court cases was how to determine if a mining operator has the technological capability to restore prime farmland to equivalent or higher levels of yield as unmined prime farmland of similar types under equipment management. It was ruled that demonstration of technological capability to restore equivalent yields could come from expert testimony that it was feasible. This ruling averted a moratorium on surface mining of prime farmland in the late 1970's.

Further demonstration of the technological capability to reclaim prime farmland, beyond the expert testimony judgement noted above, is from meeting the revegetation standards for bond release for an actual mine permit (specifics of which are discussed below in the section 'Equivalent or Higher Yields as Nonmined Farmland'). By meeting the revegetation standards such as the prime farmland standards outlined in Part 1823 of 62 Ill. Adm. Code, the mine operator has legally satisfied the requirement for returning soils to equivalent or higher yields.

Scientific testing (by academic researchers) of soil productivity following reclamation has been and continues to be done. By virtue of the experimental design, methodology, and hypotheses being tested, scientific studies are different from yield testing for bond release. For example, a study design might be to compare/contrast yields from two different soil reconstruction methods with an unmined control. The body of scientific literature pertinent to the issues of this petition is not large because it specifically focuses on western Illinois soils and because of the relatively short time period since reclamation began. Time has not allowed for long-term testing (beyond regulatory performance standards) to occur and few studies have used soils of the Tama-Ipava-Sable soil association for controls.

Despite the separate consideration given in Illinois law to the reclamation of prime farmland, in actual practice of reclamation the distinctions are not as clear. Many areas of prime farmland have been exempted from meeting the special prime farmland reclamation standards by the exemption clauses in 62 Ill. Adm. Code 1785.17(a)(1)-(3), referred to hereafter as grandfathering. Most grandfathering of prime farmland resulted from mining history or ownership that pre-dated the passage of the reclamation act in 1977. Reclamation of grandfathered prime farmland is

judged at the standards of high capability land which have more lenient crop yield testing (90% of target yield).

Given this background material, the petitioners' claim is that the special requirements for surface mining the highly productive prime farmland of western Illinois (especially the Tama-Ipava-Sable Association) can not be met. These requirements, over and above the permanent performance standards outlined in issue #1 above, are (in part) that the proposed permit's operator has 1) technological capability to restore the prime farmland, 2) within a reasonable time, 3) to equivalent or higher levels of yield as unmined prime farmland in the surrounding area, 4) under equivalent levels of management (paraphrasing from 62 Ill. Adm. Code 1785.17(e)(3)). The operators must remove, stockpile and replace soils according to the requirements of 62 Ill. Adm. Code Part 1823, as well as prove revegetation success as per the same part of the code. The numbered segments of the above paraphrased code are each discussed separately below, as is a section on soil reconstruction standards. Information has been reviewed from reclamation literature and yield testing at mine reclamation sites regarding the petitioners' claim that these standards can not be met in the petition area.

Technological Capability

Soil compaction is a chief limiting factor in the post-mining productivity of Illinois soils (Dunker and Jansen 1987b). Compaction creates excessively high soil strength and an inadequate network of soil pores such that root proliferation and plant performance are inhibited (Jansen and Dunker 1987). Jansen and Hooks (1988) found inferior productivity and sensitivity to drought when soils are compacted during reconstruction. The finer the soils material, and the higher the soil's water

content, the more compaction problems are present after reclamation (United States Department of Agriculture Forest Service 1979). Because many of the soils in the petition area have high clay content and/or propensity for wetness, compaction is potentially a serious problem. However, while texture and soil moisture are factors affecting potential for compaction, they also affect productivity. Soils which may be more susceptible to compaction may also possess qualities desirable for reconstructed mine soils (see section on reclamation capability of soils).

Drought stress is increased on compacted soils due to poor aeration and permeability (Jansen and Dancer 1982). Drought periods during the growing season are not uncommon in western Illinois, and can severely stress crops grown on compacted reclaimed soils. Although characteristics of the natural soil influence the structure of reclaimed soils, the method of reclamation largely determines the amount of compaction that will take place (Vance et al. 1987, McSweeney and Jansen 1984). Discussion of soil compaction, relative to the technological capability of restoring an area to premining soils productivity, will be divided into 'prevention' and 'alleviation' issues.

Soil scientists agree that avoiding compaction is better than trying to correct for it after it has occurred. Compaction can be circumvented by avoiding the use of heavy equipment in the placement and grading of the replaced topsoil and/or root media, and by limiting traffic across replaced materials. A conceptual method advocated by Dunker and Darmody at the University of Illinois is to use dump trucks loaded with subsoil toward the back, topsoil toward the front. The trucks could then be rear-dumped at the advancing face of the reconstructed soil, with the materials falling into place (B horizon below the A horizon). Only a light dozer would be used to smooth the surface; no other heavy equipment would trample the reclaimed soil.

Of course, some mixture of the horizons might occur; Dunker believes this might be beneficial to encouraging root growth (Dunker, U of I Department of Agronomy, personal communication, 1990). Studies have been done in southern Illinois comparing row crop responses to truck and heavy equipment (scraper) hauled root media systems. Row crop productivity (corn and soybeans) was significantly higher for sites with truck-hauled root media, with traffic limited to driving on the spoil (C horizon), than on scraper-hauled sites (Hooks et al. 1990). Truck hauling is being used at reclamation sites by some mining companies and can be considered an economically viable procedure (Dunker, U of I Department of Agronomy, personal communication, 1990). However, in general, truck hauling does not account for how most reclamation material is handled at this time.

More specific to conditions in western Illinois where the petition site is located, a study was conducted at Sunspot Mine in Fulton County (adjacent county to the south of Knox County). This study involved testing several different treatments of handling topsoil and root media replacement. For sites with mine topsoil over B-horizon replaced mine soil, gently placed and graded to avoid compaction, corn and soybeans were produced at comparable yields (not significantly different) to those yields on undisturbed Clarksdale sites in five of seven cropping seasons (Dunker and Jansen 1987a). At the same study site, Fehrenbacher et al. (1982) had found that bulk densities (and thus soil strengths) of the B horizon material in mine soils and undisturbed Clarksdale soils were similar. Clarksdale soils account for 0.39 percent of the petition site.

In addition to truck-hauled media systems, the bucket wheel excavator-conveyor-spreader system has been shown to be very effective in preventing soils compaction. The reclaimed soils, instead of being massive with high soil strength,

have a fairly loose structure with good porosity for root growth and water permeability. Reclaimed soils from this system have had excellent yields in high stress as well as low stress years (McSweeney et al. 1987). Unfortunately, the system is very inflexible and will not be used at most mine sites because it requires large areas of relatively level land with few rocks or other debris which would inhibit the use of conveyor belts (Jansen and Hooks 1988). Also, the direct cast (cross pit) subsoil handling method has been used by Mid State Coal Company at their Rapatee Mine to help reduce the number of passes of heavy equipment over subsoils prior to replacement of topsoil. Additionally, a cross pit conveyor is being used to reclaim prime farmland at the Industry Mine in McDonough County.

Compaction alleviation is a crucial issue in post-mining reclamation, despite the limited success in compaction prevention reported above. Planting of forage legumes and allowing soils to dry before replacing them lessen compaction but are not effective treatments of serious compaction problems.

Deep tillage of compacted soils has been shown to reduce soils strengths and therefore provide a better root media. Studies have been done in southern and western Illinois with the West German Kaeble-Gmeinder TLG-12 deep ripper which can rip soils effectively to a depth of 75 centimeters. Jansen and Hooks (1988) reported results of a study where crops on TLG-treated areas were more free of visible stress during a severe drought period than were untreated or natural soils areas. At the Norris Mine in Fulton County, effectiveness of TLG-12 ripping was evaluated on sites with mine topsoil replaced over graded wheel spoil, sites with wheel spoil only, and a tract of unmined Sable soils for comparison. Two-year average corn yields for ripped sites (topsoil and wheel spoil only) were comparable to yields on the unmined Sable soils while yields on the non-ripped sites were not

(Dunker et al. 1989). Sable soils occur on 2.18 percent of the petition site. In Kentucky, Powell et al. (1985) also found that ripping reduced soil bulk density and produced significantly higher crop yields that on non-ripped sites.

Natural soils depths (A and B horizons) exceed 1.5 meters at the petition site, so effectiveness of ripping to only 75 cm can be questioned in terms of restoring soils to premining productivity. Soil strength tends to increase below the rip line, thus introducing a root growth restriction. However, new deep tillage technology exists capable of ripping to 122 centimeters. When tested on highly-compacted, scraper sites in southern Illinois, deep-tilled areas produced two-year corn and soybean yields equal to the unmined soil reference area (Dunker et al. 1990). Deep ripping technology (to 122 centimeters) has been used since 1988 on several hundred acres of surface mined land in Fulton, Knox and Peoria counties by the company involved with reclamation of these areas, although research testing has not taken place to specifically assess its effectiveness in these locations.

Within A Reasonable Time

By 62 Ill. Adm. Code 1823.15 (b), the permitting authority is required to attach as a condition of a permit that the success of revegetation of prime farmland be shown within a reasonable period of time. Reclaimed prime farmland must have crop production equivalent to a target yield specified in the permit, or equivalent to the adjusted yields of nonmined land of the same soil types under equivalent management practices. Initiation of measurement of revegetation success must occur within ten years following topsoil replacement and final grading. The target (or equivalent) yields must be met for three of ten cropping years after initiation of the measurement period for successful revegetation. Target yield is calculated using the Agricultural

Lands Productivity Formula devised by the Illinois Department of Agriculture which takes the premining soil productivity index into account. Additional requirements include the necessity that at least one of the three years of proven yield occur after five years following regrading, and that at least one of the successful cropping years be with corn as the crop.

With prime farmland restoration, this clause, 'within a reasonable time', was probably intended to encourage rapid turnaround of mined prime farmlands which were cropped back into productive croplands. One scenario, used by some mining companies for the sequence of events leading up to normal cropland rotations is as follows (Hooks, U of I Department of Agronomy, personal communication 1990): (1) the landscape is reformulated during the initial summer period, and soils are treated with pH adjustments, drainage tiles, fertilizers or other procedures as necessary, (2) a forage crop (usually legumes) is seeded the first fall, (3) the area is periodically mowed during the second summer (first seeded summer) to control annual weed proliferation, (4) the forage crop is killed in the fall with the use of herbicides and/or by mechanical means, and (5) row crops are sown the following spring. The forage crop may be allowed to grow an additional year for enhancing soil tilth and nutrition, as legumes like alfalfa are known to have extremely deep rooting systems as well as nitrogen fixation. This period of 2 or 3 years toward restoring cropland productivity is certainly 'within a reasonable time'. The economics of bond release also encourage the use of procedures which restore productivity quickly.

More research is needed to determine the long-term value of leaving prime farmland in forage or other soil-building species for longer periods prior to the restoration of intensive cropping activity. For example, soil strength across the artificial soil

horizons may be reduced, and nutrient status enhanced, by leaving perennial, deep-rooting species some additional years for soil development. It could be that the long-term productivity would be enhanced by such a procedure. As such, it is difficult to place a specific time interval on the definition of 'reasonable time'.

Equivalent or Higher Yields as Nonmined Farmland

Reclaiming prime farmland to equivalent or higher yields as unmined land will be disscused relative to results of scientific studies and from yield-testing done at reclaimed mine sites currently being evaluated for bond release.

Because of the dominance of the compaction issue (either in terms of prevention or alleviation) in scientific studies, pertinent literature has been previously addressed in the 'Technological Capability' section concerning compaction. Two studies performed at sites similar to the petition area showed crop yields comparable to unmined prime farmland soils Sable and Clarksdale which occur in small proportion in the petition area. A study done by Key Agricultural Services, Inc. for Midland Coal Company at their Peoria County Elm Mine (soils similar to the petition area) showed yields on reclaimed soils as good or better than the unmined control in four of five years. However, yields on some reclaimed soils when compacted have been extremely poor compared to unmined land (Jansen and Hooks 1988). The longest of these studies was for seven years; these data do not show with unquestionable certainty that reclaimed soils can sustain high yields over the long term (Dunker, University of Illinois Department of Agronomy, personal communication 1990).

In addition to these scientific studies, another way to assess reclamation capability to produce equivalent or higher crop yields as unmined farmland is to consider yearly

crop productivity reports for mined land being reclaimed at sites near the petition area (composed of comparable premining soils). Target yields are calculated according to the Agricultural Land Productivity Formula (ALPF) as described in an earlier section, which takes a number of factors into account when setting a suitable target yield, including the productivity of the premined soils.

Data were available for four years (1985-1988) for two mines, Elm Mine in Peoria County (Permit Nos. 816-82, 982-84, and 64) and Rapatee Mine in Fulton County (Permit No. 813-82). Elm Mine crop areas were 72 percent Ipava, Tama and Sable soils premining. Rapatee Mine crop sites were 89 percent Ipava, Tama and Sable soils. At Elm Mine, 14 fields were tested over the four years. Thirteen were being evaluated at 90 percent of target yield as high capability sites (due mostly to grandfathering of prime farmland); one was prime farmland. Thirteen fields passed the criteria for meeting target yields (1 prime, 12 high capability). Passing was assessed at a 90 percent confidence level that the actual and target yields were not significantly different. Crops being tested were corn, soybeans and wheat. At Rapatee Mine, 17 fields, growing corn, wheat and soybeans, all as high capability sites, were tested in the four years. Ten fields passed yield testing and seven failed. Therefore, at these two mines, yield testing passed 74.2 percent (23 of 31) of the time (Illinois Department of Mines and Minerals 1990).

Mine operators, upon failing to meet target yields at a site may attempt to alleviate the yield-reducing problems with techniques equivalent to management used in the region and continue to try to meet target yield within the legal time frame, or they may take exceptional measures to alleviate the problems (such as deep tillage) and begin again on the revegetation measurement period. As stated earlier, three crop

years within ten following initiation of revegetation testing must meet target yield, with at least one being corn and one being at least five years past regrading.

Interpretation of these data is difficult relative to returning prime farmland to premining productivity. The vast majority of these fields were comprised of prime farmland premining, but are being evaluated at 90 percent of their expected yield potential as high capability land due to grandfathering. Therefore, bond release testing is not actually testing for prime farmland reclamation. Also, the revegetation cycle has not yet been completed, with prime farmland bond released, for any permit area dominated by the Tama-Ipava-Sable soil association. Two high capability fields of these soils (grandfathered) have met the 90 percent standard and been released (Spindler, Illinois Department of Mines and Minerals, personal communication 1990). For these reasons, these data do not reasonably demonstrate and guarantee in the long-term the return of prime farmland to 100 percent of premining productivity.

Equivalent Levels of Management

Irrigation reduces or eliminates stress due to drought on plants grown on compacted mine soils, but irrigation is not an equivalent level of management. As to the other types of reclamation, most experiments were performed using farming practices similar to those being used in the surrounding area, and often those recommended by handbooks put out by the U. S. Department of Agriculture.

Soil Reconstruction Standards

Under 62 Ill. Adm. Code 1823.12 mine operators on prime farmland are required to separately remove the entire A horizon, the B horizon, and the underlying C horizon,

which will create a soil having an equal or greater productive capacity than that which existed prior to mining. If the mine operator can demonstrate that B and C horizon mixtures will be equally or more productive as separate handling of the B and C, B/C mixtures are allowed. The study mentioned earlier done by Key Agricultural Services, Inc., for Midland Coal Company at their Elm Mine showed that B/C mixtures are helpful in improving soil texture. Under 1823.14 of the same title, the minimum depth of the newly constructed soil is 48 inches except where natural rock formation occurs at shallower depths. The Department shall specify a depth greater than 48 inches wherever necessary to restore productive capacity due to uniquely favorable soil horizons at greater depths. In addition to these requirements, the soil horizons have to be stockpiled separately and replaced in a manner that prevents excessive compaction. The A horizon (or a suitable alternative material) must be the final surface layer and must equal or exceed the thickness of the original soil. The method used to replace the A horizon must protect the surface layer from wind and water erosion before it is seeded or planted. Finally, whatever nutrients and soil amendments needed to quickly establish vegetative growth must be applied.

For high capability lands, the requirements for soil reconstruction are a little different (62 Ill. Adm. Code 1825.14). A minimum of eight inches of darkened surface soil has to be removed and segregated for replacement, and of course, be replaced. Less may be replaced if the original top soil was less than eight inches in depth. The combined depth of such surface soil and suitable rooting medium must be at least 48 inches in all cases unless a natural rock formation made the soil shallower in the premined soil. The soil has to be graded to its original contour, with the limitation that the end slope must be conducive to row crop production. Again, it is necessary that the operator take steps to provide adequate drainage and erosion control for sustained row crop production.

As noted above, the major problems that an operator will encounter in the petition area will be the difficulty in moving and storing the deep soils, and replacing them without excessive compaction. "Successful soil construction involves preparation of an adequate base, selection of high quality soil materials, and placement of those materials by means which will establish a continuous macropore network and modest to low soil strength. Where such has been accomplished, experiments reveal row crop productivity on reclaimed land which is very competitive with that on undisturbed land". Where these criteria are not met, soils of inferior productivity will result (Jansen and Hooks 1988).

Capability of Soils for Reclamation

The soils in the petition area were evaluated for capability for reclamation. The index developed here is simply designed to provide people not intimately familiar with the soils in question with comparative information on each soil's attributes with respect to their capability to support vegetation following mining disturbance. It was based on the soil's capability to chemically and physically provide the necessary water and nutrient supply for optimal growth and root development of plants. Obviously, the premining soil condition also dictates the post-mining productivity requirements via the Agriculture Land Productivity Formula. The index devised here does not address the feasibility of each soil to obtain its respective productivity requirement, only its capability to support vegetation following the mining process.

The scheme developed was based on a U.S. Department of Agriculture publication, discussions with and publications from researchers from the University of Illinois Department of Agronomy, and the author's 14 years of experience in plant-soil

interactions. The subjective aspects of the index are the decisions regarding the attributes selected and the relative weights to be assigned to each of the attributes. For this case, the author elected to weight those attributes related to texture (which, in turn, relate to tendency toward compaction and water holding capacity) most heavily, as the research indicates this to be the major limiting factor in restoring productivity in western Illinois. After decisions regarding weights are made, the derivation of the index for each soil is totally objective and depends on their characteristics as published in the soil survey. The following information is summarized in Table XI-5 and the results of the overall ratings are mapped in Map 85. Areas having the highest capability for reclamation are shown on the satellite image of the area in Map 86.

Texture

Of all the parameters, those related to texture are the most important since water and nutrient relationships following reclamation are determined by compaction and the texture (along with soil replacement technology) affects the compaction level. Texture is determined by two factors: the size of soil particles (sand, silt or clay), and the relative proportion of each of these different-sized particles. A soil with a texture well-suited for reclamation will either have more or less equal parts of sand, silt and clay (loam), or will have slightly more silt (silt loam), or sand (sandy loam), with respect to clay. In general, the higher the clay content (once above about 30%), the less suitable the texture is for reclamation. However, soils with high amounts of sand (>50%) are also less suited for reclamation. Soils high in clay retain water well, but their permeability is low. Sand is the opposite--permeability is high and water retention is low. The higher the water content and the finer the material, the greater the hazard of compaction during reclamation; yet, if the

materials are correctly handled during the reclamation process, higher clay (up to about 35%) means greater water holding capacity for crop production during subsequent drought years. Thus, the soil texture is of critical importance and there is a tradeoff, determined by material handling and follow-up procedures, between attaining capacity to hold sufficient moisture for high crop productivity through drought periods and rebuilding a compacted soil with very low root penetration and drought-sustaining capability.

Nearly all of the soils which received a rating of fair suitability for texture did so because of high clay content (> 27% clay, resulting in silty clay loam or clay loam). Clarksdale, Atlas, Assumption, Coatsburg, Denny, Ipava, and Keomah soils have a clay content of 30 to 45 percent in the A and B horizons. Other soils which received a fair rating in texture for the B horizon were those with clay content in the 27 to 35 percent range. These soils are the Downs, Elco, Hickory, Marseilles, Rapatee, Sable, Sylvan, and Tama soil series. Alvin received a fair rating for its high sand content--45 to 70 percent in the A and B horizons, and Lenzburg received a poor rating for its high clay and high rock fragments in the C horizon (no B horizon in Lenzburg).

Salinity

Although potentially an important factor, this parameter was not included in the table, because none of the soils in the petition area have known problems with salinity. Before a potential problem for reclamation is posed, salinity must be greater than 3 mmho/cm.

Alkalinity

Alkalinity is not a factor in the petition area. It is primarily a problem in the western United States.

Concentration of Toxic or Undesirable Elements

There are no known problems with toxicity or other undesirable elements in the petition area soils. However, it would be wise to take overburden samples of the area to be mined, to verify the absence of salinity, alkalinity, and toxic elements, because their presence could pose serious problems for a reclamation project. Care must be taken to bury any objectionable strata if they are found near the top or bottom of the section of soil. However, any undesirable characteristics found in the middle of a section cannot be easily separated from the more favorable soil. One can only hope that, in these cases, the inevitable mixing that occurs from handling the soil during reclamation will dilute out the undesirable elements and their detrimental effects upon the soil will be minimized.

pH

Soils receiving a good rating for pH with respect to their capability for reclamation have a pH in the range of 6.1 - 7.8, and soils with a fair rating have either a pH of 5.1 - 6.1 or 7.9 - 8.4. None of the soils have a poor rating for pH (Table XI-5). A lower pH can be a problem because some elements which are undesirable at high concentrations, such as iron and aluminum, are soluble at a low pH, and this may cause a toxicity problem.

Moist Consistency

The moist consistency criterion is based on the structure of the soil profile, and pertains to the capacity of the soil to consistently provide moisture to growing plants. A good rating results from a soil with a very friable, or friable structure, while a fair rating is the result of loose or firm structure, and a poor rating occurs with soils having very firm or extremely firm structures. Several soils received a fair rating because of firm subsoil (due to high clay); these included Assumption, Clarksdale, Denny, Downs, Elco, Fayette, Hickory, Keomah, Marseillles, Rapatee, Rozetta, Sable and Sawmill soils. The Sawmill soil also received a fair rating for the surface horizon. Soils with a poor rating for some portion of the A and B horizons include Atlas, Coatsburg, and Rapatee (Table XI-5). The Rapatee is very firm because of compaction during the reclamation process, while the Atlas and Coatsburg are very firm because of a strongly developed paleosol.

Coarse Fragments

The percentage of coarse fragments is important because it determines the ability to run certain types of equipment on the land as well as compete with plants for cover over the surface. Soils with less than 10 percent coarse fragments by volume rate good, 10 to 20 percent coarse fragments rate fair, 20 to 35 percent rate poor, and more than 35 percent rate unsuitable in capability for reclamation (United States Department of Agriculture Forest Service 1979). With the soils on the petition area, only the Lenzburg subsoil rated fair because of coarse fragments exceeding 10 percent. All other soils rated good for this parameter, for both horizons (Table XI-5).

Permeability

Permeability is important in capability for reclamation because it determines the rate of infiltration into subsoils after precipitation events. The slower the permeability, the greater runoff and less storage of moisture for plant use. On the other hand, excessive permeability due to very coarse textured materials also results in moisture deficiencies as the water percolates below the effective rooting depth. Soils with 0.6-6.0 inches of water percolation per hour after a saturating precipitation event rated good, soils 0.2-0.6 inches per hour rated fair, and soils less than 0.2 or more than 6.0 inches of percolation per hour rated poor (United States Department of Agriculture Forest Service 1979). For the soils on the petition site, the subsoil horizons of the Atlas, Coatsburg, Marseilles, and Rapatee all rated poor because of excessively slow permeability from the tight, clay soils and, in the case of Atlas and Coatsburg, from a strongly developed paleosol. Several other soils, including the Clarksdale, Denny, Downs, Ipava, Keomah, and Lenzburg, had a fair rating for the subsoil horizon again due to fairly high levels of clay (Table XI-5).

Organic Matter

The percentage of organic matter in the surface soils is important for reclamation capability because it is related to the capacity of the soil to provide moisture and nutrients to growing plants. Soils developed under forest vegetation typically have much lower organic content on surface horizons, while soils developed under prairie vegetation have higher organic content because of the decomposition of dense, fibrous root systems. The dark, prairie soils are superior to forest soils in releasing nutrients and moisture to the plants, and thus, have higher productivity ratings if all other attributes are similar. Soils with more that 1.5 percent organic matter are rated

good, 0.5-1.5 are rated fair, and less than 0.5 percent are rated poor for this suitability criterion (United States Department of Agriculture Forest Service 1979). The petition soils all rated good or fair for this parameter (Table XI-5). Soils rating fair included Alvin, Atlas, Camden, Fayette, Hickory, Keomah, and Sylvan, all of which formed under deciduous forest vegetation.

Soil Depth

Soil depth of the control section (A and B horizons) is important for reclamation capability because it gives an indication of the amount of suitable material available for rebuilding the soil following the mining process. Of course, the lower horizon (C) material can, in some cases (especially soils developed under deep loess), provide excellent rooting material as well; this cannot be counted on however, and should be evaluated on a case by case basis. In our rating, soils were classed according to depth of the A horizon as well as depth of the A plus B horizons. A horizon depths were grouped as 0-8, 9-12, 13-16, 17-20, and 21 or more inches, while the classes for A plus B were: 30 or less, 31-40, 41-50, 51-60, and more than 60. Each rating was on a 0-4 scale, with the maximum points potentially being 8 for a particular soil. Under this scheme, the best soil of the petition area was Huntsville, a depositional bottomland soil with a 27 inch A horizon and a 25 inch B horizon (Table XI-5). Other soils rating high were Sawmill (32 inch A, 18 inch B), Lawson, (40 inch A, no real B), Littleton (26 inch A, 20 inch B), and Denny (20 inch A, 30 inch B). On the other end of the spectrum, it is not surprising to see the previously mined soils rating poorly for the A horizon, and the next lower strata is really C horizon material. The Orion soil, with a 6 inch A and 16 inch B developed over a paleosol, also rates very low for this parameter.

Soil Structure

Soil structure of the rooting material is also very important as it determines the capacity of plants to extract nutrients and water from the soil. Even if water or nutrients are present in the soil, they would not be as available for plant growth if the soil provided physical barriers to root penetration and proliferation. Soils with granular or crumb structure are most suited for root penetration (rating of good), while soils with platy, blocky, or prismatic structure rated fair, and soils with massive or single grain structure rated poor (United States Department of Agriculture Forest Service 1979). With the soils of the petition area, most soils rated fair for soil structure, with blocky or prismatic structure, while the Lenzburg and Rapatee soils rated poor because of the massive nature of the newly disturbed soil (Table XI-5).

Phosphorus and Potassium

The phosphorus (P) and potassium (K) supplying power of the subsoil is important as an indication of the amount the P or K plants can use once the roots penetrate the subsoil (Fehrenbacher et al. 1984). Fertilization usually only treats the surface horizon and the capacity of the subsoil to provide P and K are important factors for long-term productivity following mining activity. Only four of the petition area soils provide high P and K supply: Downs, Fayette, Rozetta and Tama. Keomah also supplies a high amount of P, and Elkhart and Ipava also supply a high amount of K (Table XI-5). Alvin, Atlas and Marseilles supply low amounts of both nutrients.

Available Water Retention Capacity

The available water-retention capacity, in inches of water per inch of soil, is an indication of the ability of the soil to provide water to crops. A number of factors are related to this character, including mostly texture characters but also organic content, osmotic or matric water potential, and structure of the soil. To be rated good, the soil must have more that 0.16 inches of water available per inch of the soil column. A fair rating is the result of values 0.08-0.16, and a poor rating results from less than 0.08 inches of water available per inch of soil (United States Department of Agriculture Forest Service 1979). For our soils, only the very sandy Alvin soil rated poor for this criterion, while several other soils rated fair in one or both horizons: Atlas, Coatsburg, Lenzburg, Marseilles and Rapatee (Table XI-5).

Drainage Class

The drainage class of the soil is of interest because of the situation in western Illinois where soil compaction appears to be the major limitation to the restoration of full prime farmland productivity (Jensen and Hooks 1988). Soils with poorly drained or somewhat poorly drained drainage classes are likely to be wet over a greater portion of the year; thus the probabilities of moving the soil while wet are greater. Any handling of a soil with a high amount of moisture will likely increase the probability that the soil will be compacted upon restoration of the soil profiles. Of course, the degree of compaction of a particular soil depends on the soil characteristics and the techniques and equipment used for the soil handling (as discussed previously).

TABLE XI-3

CAPABILITY OF PETITION SOILS FOR RECLAMATION

Soil Series	Hori-zon	Texture	pH	Moist Consistency	Coarse Fragments	Permeability	Organic Matter	Depth (inches)	Soil Structure	P	K	Available H_2O	Drainage Class	Score*
Alvin	A	Good	Fair	Good	Good	Good	Fair	18	Fair			Poor	W	38
	B	Fair	Fair	Good	Good	Good		26	Fair	L	L	Poor		
Assumption	A	Good	Fair	Good	Good	Good	Good	12	Fair			Good	MW	[illegible]
	B	Fair	Fair	Fair	Good	Good		35	Fair	M	M	Good		
Atlas	A	Good	Fair	Good	Good	Fair	Fair	9	Fair			Good	SP	[illegible]
	B	Fair	Fair	Poor	Good	Poor		60	Fair	L	L	Fair		
Camden	A	Good	Good	Good	Good	Good	Fair	12	Fair			Good	MW	50
	B	Good	Good	Good	Good	Good		40	Fair	L	M	Good		
Clarksdale	A	Good	Fair	Good	Good	Good	Good	12	Fair			Good	SP	46
	B	Fair	Fair	Fair	Good	Fair		36	Fair	M	M	Good		
Coatsburg	A	Fair	Good	Good	Good	Fair	Good	12	Fair			Good	P	41
	B	Fair	Fair	Poor	Good	Poor		48	Fair	M	M	Fair		
Denny	A	Good	Good	Good	Good	Good	Good	20	Fair			Good	P	46
	B	Fair	Fair	Fair	Good	Fair		30	Fair	L	M	Good		
Downs	A	Good	Fair	Good	Good	Good	Good	12	Fair			Good	MW	[illegible]
	B	Fair	Fair	Fair	Good	Fair		40	Fair	H	H	Good		

See footnote at end of table

TABLE XI-3 (Continued)

CAPABILITY OF PETITION SOILS FOR RECLAMATION

Soil Series	Hori-zon	Texture	pH	Moist Consistency	Coarse Fragments	Permeability	Organic Matter	Depth (inches)	Soil Structure	P	K	Available H_2O	Drainage Class	Score[1]
Elco	A	Good	Good	Good	Good	Good	Good	12	Good			Good	MW	56
	B	Fair	Good	Fair	Good	Good		48	Fair	M	M	Good		
Elkhart	A	Fair	Good	Good	Good	Good	Good	10	Fair			Good	W	55
	B	Fair	Fair	Good	Good	Good		20	Poor	M	H	Good		
Fayette	A	Good	Fair	Good	Good	Good	Fair	11	Fair			Good	W	53
	B	Fair	Fair	Fair	Good	Good		35	Fair	H	H	Good		
Hickory	A	Good	Fair	Good	Good	Good	Fair	11	Good			Good	W	48
	B	Fair	Fair	Fair	Good	Good		35	Fair	L	M	Good		
Huntsville	A	Good	Good	Good	Good	Good	Good	27	Good			Good	W	64
	AC	Good	Good	Good	Good	Good		25	Fair	M	H	Good		
Ipava	A	Fair	Good	Good	Good	Good	Good	16	Fair			Good	SP	52
	B	Fair	Good	Good	Good	Fair		34	Fair	M	H	Good		
Keomah	A	Good	Fair	Good	Good	Good	Good	12	Fair			Good	P	44
	B	Fair	Fair	Fair	Good	Fiar		36	Fair	H	M	Good		
Lawson	A	Good	Good	Good	Good	Good	Good	40	Fair			Good	SP	56
	C	Good	Good	Good	Good	Good		10	Fair	M	M	Good		

See footnote at end of table

TABLE XI-3 (Continued)

CAPABILITY OF PETITION SOILS FOR RECLAMATION

Soil Series	Hori-zon	Texture	pH	Moist Consistency	Coarse Fragments	Permeability	Organic Matter	Depth (inches)	Soil Structure	P	K	Available H_2O	Drainage Class	Score
Lenzburg	A	Fair	Fair	Fair	Good	Fair	Fair	2	Fair			Fair	W	[illegible]
	C	Poor	Fair	Poor	Fair	Fair		58	Poor	L	M	Fair		
Littleton	A	Good	Good	Good	Good	Good	Good	26	Good			Good	SP	57
	B	Good	Good	Good	Good	Good		20	Fair	M	M	Good		
Marseilles	A	Good	Fair	Good	Good	Good	Good	11	Good			Good	W	[illegible]
	B	Fair	Fair	Fair	Good	Poor		28	Fair	L	L	Fair		
Orion	A	Good	Good	Good	Good	Good	Good	6	Fair			Good	SP	50
	C	Good	Good	Good	Good	Good		16	Fair	M	M	Good		
Orthents[4]														
Radford	A	Good	Good	Good	Good	Good	Good	19	Fair			Good	SP	[illegible]
	C	Fair	Good	Good	Good	Good		10	Good	M	M	Good		
Rapatee	A	Fair	Good	Good	Good	Fair	Good	6	Fair			Fair	W	42
	C	Fair	Good	Poor	Good	Poor		60	Poor	L	M	Fair		
Rozetta	A	Good	Fair	Good	Good	Good	Good	11	Fair			Good	MW	[illegible]
	B	Fair	Fair	Fair	Good	Good		40	Fair	H	H	Good		

See footnotes at end of table

TABLE XI-3 (Concluded)

CAPABILITY OF PETITION SOILS FOR RECLAMATION

Soil Series	Hori-zon	Texture	pH	Moist Consistency	Coarse Fragments	Permeability	Organic Matter	Depth (inches)	Soil Structure	P	K	Available H_2O	Drainage Class	Score[a]
Sable	A	Fair	Good	Good	Good	Good	Good	20	Fair			Good	P	48
	B	Fair	Good	Fair	Good	Good		27	Fair	L	M	Good		
Sawmill	A	Fair	Good	Fair	Good	Good	Good	32	Fair			Good	P	49
	B	Fair	Good	Fair	Good	Good		18	Fair	L	M	Good		
Sylvan	A	Fair	Good	Good	Good	Good	Fair	12	Fair			Good	W	50
	B	Fair	Good	Good	Good	Good		18	Fair	M	M	Good		
Tama	A	Good	Good	Good	Good	Good	Good	14	Fair			Good	MW	58
	B	Fair	Fair	Good	Good	Good		35	Fair	H	H	Good		

[a]Summation of point values assigned for rating all characteristics for reclamation suitability. See text for complete description.
[b]Data unavailable

Reclamation Capability Scores

A scoring scheme was devised to objectively rank the soils of the petition area for their capability for reclamation. Each of the above-described criteria was given scores, where higher number values indicated better capability for reclamation. Where ratings were given for both A and B horizons, point values were 0 for poor, 1 for fair, and 2 for good ratings for each horizon such that the total range for each soil series was 0-4. This rating scheme was used for texture, pH, moist consistency, coarse fragments, permeability, and soil structure. For organic matter and available water capacity, the rating scheme described above was doubled such that the total range was 0-8. With P and K supplying capability of the B horizon, ratings were 0 for poor, 2 for fair and 4 for good. The clay and sand percentages in the control section were given rankings of 0 if the levels were problematic (if clay exceeded 35% or sand plus rock fragments exceeded about 40%) and 2 if they were not interpreted as problematic. Point values for solum depth were given previously. Finally, drainage class ratings were as follows: 0 for very poorly drained, 2 for poorly, 4 for somewhat poorly, 6 for moderately well, 8 for well, and 10 for excessively well drained. The higher weighting given for organic matter, available water, and drainage class was done because of the relative importance for reclamation capability and the limited redundancy among the variables as is the case with texture and its related factors (e.g., texture, percent clay and sand, coarse fragments, and permeability).

Overall the soils of the petition area had scores ranging from 35 for the Atlas soil (very high clay with poor permeability and moist consistency, somewhat poorly drained) to 64 for the Huntsville soil (good texture, moist consistency, permeability, organic matter, depth, and nutrient supply; well drained with high available water

capacity) (Table XI-5). Tama soil also rated very high and was responsible for 42 percent of the petition area being in the highest class of reclamation capability (Map 85). The maximum score possible under this scheme was 70. Two major, highly-productive, non-disturbed soils of the area, Ipava and Tama, were docked somewhat in their index value because of the fine-grained nature of at least the B horizon (Table XI-5). This aspect should send out a signal for the importance of careful material handling to prevent compaction problems, and the possible benefits that may accrue from the mixing of B with more coarse textured material from the C horizon. Similarly, other soils can be assessed using Table XI-5 to determine major limiting factors of the particular soils and to suggest possible amelioration techniques during the reclamation process. Note that although the index value generally correlates with productivity index, differences exist because of the fact that productivity index is an integrated measure of the capacity of the pre-mined soil to produce, while the capability for reclamation index evaluates the potential (and possible limitations) of the post-mined soil to produce.

When one looks at the spatial distribution of reclamation capability, much of the petition area soils rate quite high (Map 85). When reclamation capability is viewed on the satellite image (Map 86), one can see that a large portion of current cropland is categorized as very capable for reclamation. Sixty-six percent of the cropland of the petition area rates in the top two capability classes (score > 53), with 91.5 percent of cropland rating in the top three classes. However, this same area has a weighted productivity index of 141, so that there is indeed a very high level of restoration needed to achieve premining levels of productivity.

F. IMPACTS ON BIOLOGICAL RESOURCES

Introduction

Impacts on biological resources are the result of any substantial modification of a natural system caused by human actions. In some cases it is difficult to predict potential impacts because of the complex nature of natural systems and a lack of detailed knowledge about some species. It may also be difficult to assess the significance of expected impacts to a natural system or to human values. Surface mining involves a dramatic modification of an area and the destruction of its natural communities. Thus, short-term impacts on biological resources are relatively easy to assess. The long-term effects of human actions, however, must also be considered. Reclamation of an area following surface mining will enable it to support vegetation and wildlife, although not necessarily the pre-existing communities. The outcome of reclamation procedures will determine the long-term impacts of mining on the area's biological resources. Suggestions for increasing the benefits of the reclaimed land for biological communities are included in the following discussions of the short and long-term impacts of surface mining on the petition area.

Wildlife

Mammals

Larger mammals, including some game animals and furbearers, would probably be able to disperse from the petition area before its destruction by surface mining. Surrounding areas would provide suitable habitat for these species, although it might be difficult for dispersers to become established in areas already occupied by resident

individuals. Bats are highly mobile and human activity in the area might cause them to abandon their summer roosts (trees or buildings) before they were destroyed by mining. Non-volant young or hibernating individuals, however, could be killed if their roosts were destroyed. Even if hibernating bats escaped and found other suitable hibernacula, their energy reserves would be significantly depleted and their probability of survival lowered. Many individuals of small terrestrial species would probably be killed during surface mining.

Following reclamation the petition area would be recolonized by mammals (Verts 1960; Pentecost and Stupka 1979; Urbanek and Klimstra 1986). Four species of small mammal (prairie vole, meadow vole, white-footed mouse and house mouse) became established at a coal refuse site in Macoupin County within two years of reclamation (Pentecost and Stupka 1979). The white-tailed deer, opossum, raccoon, muskrat and eastern cottontail were also observed at the site shortly after reclamation. Twenty-six species of mammals were found on land surface-mined six to 24 years earlier in Perry County (Verts 1960). Habitat diversity and woodland edge contributed to small mammal abundance and diversity on reclaimed land in southern Illinois (Urbanek and Klimstra 1986). If the petition area consisted of the same mosaic of habitat types that existed before mining, the eventual composition of the mammalian fauna would also be essentially the same. Wooded, native grass, and wetland areas should be interspersed with agricultural land to promote mammalian diversity.

Birds

On a short-term basis, surface mining would eliminate most habitat available for the majority of birds within the petition area. Habitat destruction and disturbance from

mining machinery would contribute to the decrease in avifauna. Because birds are mobile organisms they can avoid disturbance by moving to adjacent or nearby areas if the habitat is suitable. Habitat similar to that present in the petition area is abundant throughout Fulton, Knox, and Peoria counties.

The most severe effects from surface-mining would be experienced by resident and breeding bird species (Table VII-2). Some resident bird species such as the house sparrow, horned lark, European starling, probably would continue to use the petition area because they have adapted well to different kinds of human disturbance. However, most habitats used to raise young and over-winter would be systematically destroyed.

The majority of migrant waterfowl probably would avoid the petition area. Many surface-mine ponds and the Illinois River are located within approximately 25 miles and would provide foraging and stop-over habitat for migrants. The Canada goose may be an exception and remain in the area because the species has adapted to row-cropping and other types of human disturbance.

Endangered and threatened species probably would avoid the petition area, also. Alternate foraging and wintering habitats are available throughout Fulton, Knox, and Peoria counties. If suitable breeding habitat does occur within the petition area, it should be surveyed for the presence of endangered and threatened species immediately prior to mining. For example, because of the recent breeding records for the upland sandpiper and the loggerhead shrike in Knox County (Appendix F Table 2), it should be established that these species are not breeding in appropriate habitat located within the petition area immediately prior to mining.

In the long term, a well designed and implemented reclamation plan could result in an overall increase in value of the petition area for bird species. An increase in avian diversity on reclaimed surface-mined land has been associated or correlated with foliage height diversity, vegetative diversity, and habitat structure (Karr 1968; Pentecost and Stupka 1979; Urbanek and Klimstra 1986). An increase in habitat diversity, in time, may attract more bird species to the petition area than are presently using it.

An increase in large wetlands containing emergent and aquatic vegetation would provide foraging, migration stop-over, and perhaps breeding habitat for waterfowl species. Wetland reconstruction that includes emergent shallows and mudflats would provide habitat for waterfowl, shorebirds, rails, snipe, waders, and passerines that are associated with wetland habitats and have been recorded in Fulton, Knox, and Peoria counties (O'Leary et al. 1984;Perkins and Lawrence 1985).

Pentecost and Stupka (1979) found that the absence of soil arthropods on recently surface-mined land may limit the use of the site by insectivorous birds and that the addition of mulch at the time of seeding would have improved the habitat quality for soil fauna. Soil fauna in and around ponds is also extremely important to shorebirds and some waterfowl species.

An interspersion of diverse woodlands and grasslands would benefit upland game birds, passerines, and raptors. Planting native tree species and seeding native grasses are encouraged. Fine-tuning certain habitats to improve them for endangered and threatened species can be included in reclamation plans. For example, the upland sandpiper prefers extensive grasslands of varying heights during the breeding season and the loggerhead shrike requires grasslands, thorny trees or shrubs or barbed wire,

and exposed hunting perches (IFWIS). Several of these habitat variables could be created in place of a monoculture of fescue. Patches of suitable breeding habitat for wintering species, such as the northern harrier and short-eared owl, could be established in attempts to attract them as breeding species.

Therefore, the petition area could be of more benefit to avifauna if reclamation provided both an increased number of habitat types and more diversity within habitat types (O'Leary et al. 1984; Lawrence et al. 1985). Riparian corridors, grassland/woodland mosaics, emergent wetlands, and ponds may be reclaimed to a better state than the habitats that exist presently.

Reptiles and Amphibians

Since many reptiles and amphibians have limited mobility, most of the individuals within the petition area would be destroyed during surface mining. Some individuals might escape to surrounding areas where they might or might not find suitable habitat. A reclamation plan that included ponds would provide suitable habitat for aquatic reptiles and amphibians. Ponds should be constructed with shallow margins to encourage the growth of emergent vegetation. Since succession is a slow process, shrubs or trees should be planted around some ponds to provide additional shade for aquatic and semi-aquatic species and suitable habitat for arboreal species. Habitat diversity resulting from an interspersion of wooded and grassland areas with agricultural land could provide habitat for several terrestrial species.

Recolonization of the reclaimed area will depend upon types of habitat present and the proximity of other populations from which individuals can disperse. Utilization of previously surface-mined areas by reptiles and amphibians has been studied in

southern Illinois (Myers and Klimstra 1963; Pentecost and Stupka 1979; Urbanek and Klimstra 1986). In Macoupin County, three species of amphibians (American toad, cricket frog and southern leopard frog) colonized a pond within one month of its creation (Pentecost and Stupka 1979). Nineteen to 29 years after cessation of surface mining, 32 species of amphibians and reptiles were found at the Pyatts Stripland Research Area in Perry County (Myers and Klimstra 1963). Salamanders were uncommon, but Fowler's toad, six frogs, two turtles and two snakes were common. Semi-aquatic species were more successful than terrestrial species in invading the area and amphibians and reptiles were more abundant in shallow ponds between spoil banks than in deeper ponds formed by inundation of old haulage roads and final box cuts (Myers and Klimstra 1963).

Fishes

The streams in this section of the Western Forest-Prairie Division have been adversely affected by agricultural practices and the mining of coal. The impacts of surface mining on the fishes inhabiting the streams draining the petition area will depend on whether the streams are dewatered or allowed to remain intact. If the streams are dewatered, there obviously will not be any fishes in the petition area for the duration of the mining operation. Following reclamation of the area, the headwater fishes should recolonize the streams if they are properly restored.

If the streams are allowed to remain flowing, the main factors determining the impacts of surface mining on the stream ecosystem will be excessive siltation, toxic substances from machinery, and disruption (or decrease) of water flow. Any increase in soil erosion or decrease in water flow will have a detrimental effect to the fishes (and invertebrates) inhabiting the streams. Increased turbidity and the deposition of

silt over substrates that were once sand and gravel will lead to the disappearance of the remaining aquatic vegetation, the loss of substrate used as cover by benthic fishes, and the destruction of feeding and spawning sites.

The headwater fishes likely to occur in the streams draining the petition area should survive if siltation and pollution are kept to a minimum. To do this, a riparian edge (width will be determined by vegetative type and slope of surrounding land) must remain along the length of the streams. Settling basins of appropriate size and frequency will also reduce the amount of hazardous material entering the streams.

Surface mine ponds (and lakes) should be carefully planned to contain a variety of substrates, depths and shoreline patterns with emergent vegetation, so that they are morphologically similar to natural lakes. These "naturalized" surface mine ponds and lakes should provide ample cover, spawning sites and food for a variety of game fishes.

Final-cut lakes are generally steep-sided basins that do not contain the variety of depths, substrates and shoreline patterns present in natural lakes and potentially present in the surface mine ponds. Although final-cut lakes generally have one or more incline ramps which provide a shallow water area, and in certain situations some slopes to final cut have been graded ten percent or less providing substantial littoral zone, it is the combination of varying depths (as opposed to continually sloping ramps), shoreline patterns, substrate composition and vegetative cover that allow carefully planned surface mine ponds to potentially support a more productive sport fishery than final cut lakes (Ken Russell, IDOC, personal communication).

G. IMPACTS ON SOCIOECONOMIC RESOURCES

Impacts on Cultural Resources

Without adequate provision mining will destroy cultural resources without an opportunity to recover potentially important information. A determination of the impact of mining on such resources in Salem Township depends on three factors. First, it requires completion of a comprehensive inventory of sites. Second, the Illinois Historic Preservation Agency and/or the Historic Sites Advisory Council must complete a determination of site eligibility based on a complete Phase I archaeological and architectural reconnaissance. The potential for nomination to the National or Illinois Register of Historic Places requires a site by site assessment. Third, development and implementation by the mining company of an adequate mitigation program. Mitigation may include avoidance of significant properties or scientific recovery of information before mining. At present none of these tasks are complete. Thus, this is a preliminary impact assessment.

Prehistoric American Indian Sites

The Illinois Archaeological Survey site file contains no record of extant, documented prehistoric sites in Salem Township. It is highly probable that this is due to the lack of investigation rather than the lack of sites. The lack of information limits development of an impact assessment. To overcome this limitation, we analyzed the distribution and antiquity of all recorded archaeological sites in Knox County. Three conclusions are noteworthy. First, sites are common in upland settings similar to the topography of Salem Township. Second, Archaic sites are most common. Third, there are sites from other cultural periods in this setting.

It is not possible to predict the chance of finding National Register candidate sites in Salem Township. It is noteworthy, however, that archaeologists have documented significant sites in similar settings (Farnsworth 1985; Warren and Ferguson 1989).

Historical American Indian and European Archaeological Sites

Maple (1912:45) describes a Potawatomi village in the SW 1/4 of Section 25, Salem Township. According to the most recent topographic sheet, this area has been mined. In addition, Clark (1968:146) refers to the location of two Potawatami villages near Farmington, one mile south of the petition area. It is likely that Potawatami hunting parties traversed Salem Township and there is a chance that they set up camps in the area.

Historical American Archaeological and Architectural Sites

The data on historical American archaeological and architectural sites is the most comprehensive. However, a determination of eligibility to the National or Illinois registers requires field inspection.

Sixty-two residential buildings and three schools appear on the plat maps and topographic sheets. Thirty-eight (38/62=61%) are no longer standing. Thus, what remains of these 38 structures and their resident's way of life is part of the archaeological record.

In general, there is a direct relationship between site antiquity and site significance, and an inverse relationship between significance and the duration of occupation. Thus, other things being equal, old sites with a short duration of occupation are more

likely to be significant. Four sites (2, 4, 21, and 24) may be significant based on this criteria. All appear on the 1861 plat map but not on the 1870 edition. An additional thirteen homes do not appear on the 1903 plat map. The remainder (n=18) do not appear on the 1974 of 1982 topographic sheets or they were not observed during the 'windshield'.

Architectural significance is dependent on antiquity and structural integrity. Sixteen extant residences appear on the 1861 plat map. A dètermination of their antiquity and architectural integrity will require field inspection.

The Cooper House (Sec. 15) is a potentially significant example of Italianate architecture (IDOC 1973).

The Terrell residence and blacksmith shop may be eligible for nomination to the National Register by virtue of historical and archaeological merits, rather than its architecture.

The only cemetery documented for the area, the Yates City Cemetery, is still active.

Impacts on Modern Resources

Relevant economic impacts as highlighted in Chapter XE include impacts on market value and sales tax revenue, property tax revenue, local expenditure for social services, employment, personal income, and state income taxes. The remainder of this section will address transportation and land use impacts.

Impact on Transportation Resources

Petitioner allegations related to the transportation system adjacent to the petition area focus on three major concerns: increased coal-hauling traffic and a resultant decrease in road conditions and road safety. In particular, allegations pertaining to traffic volume state that surface mining operations in the petition area will result in heavy coal-hauling traffic traveling on Knox County Highway #22. It is alleged that the increased coal-hauling traffic will overwhelm the usage of Knox County Highway #22, causing a breakdown and deterioration of the road serving farmers. In addition, the increased coal-hauling traffic along Knox County Highway #22 will allegedly result in substantial danger to residents who live along the road, and periodic visitors to a historic structure located along the roadway.

The intent of this report is to objectively evaluate whether mining operations in the petition area would have any or all of the effects described above. Specifically, how will transportation resources change in the future under two conditions: 1) mining does not occur, or 2) mining does occur in the petition area. It is important to focus on this distinction because it appears there will be little change in the transportation resources of the study area if the petition area is opened to surface mining.

Transportation of Mid State coal from mine to customer actually involves two shipping segments: from pit to Rapatee Mine's processing plant, and from processing plant to customer. The first segment involves hauling coal from the pit to the Rapatee Mine processing plant using Mid State owned and operated off-road haulage trucks and Mid State haulage roads built specifically to accommodate this equipment. The second segment involves commercial contract trucks hauling coal from the mine's processing plant located on Route 116, to customers in a variety of locations.

Opening the petition area to mining would only impact the first segment haul from pit to processing plant. Existing private haulage roads would most likely be extended into the petition area. This would probably require crossing Knox County Highway #22 and as with all crossing sites, would need to be approved beforehand by appropriate governing officials and bonds posted where required. Similar to the existing haulage road crossing site on Route 116, a traffic control signal would probably be required by governing officials.

On a typical day, 30 to 40 loads of coal would cross a public road at any one designated crossing point enroute to the processing plant. Haulage of coal from the pit is generally done during the week, occasionally on Saturday, but never on Sunday or holiday. Accident data from 1982-1988 do not reveal that the current crossing site on Route 116 is a particularly hazardous area. Traffic accidents do seem to cluster at the intersection of State Highways 97 and 116, just west of the processing plant, however accidents cluster at all major intersections of roads adjacent to the petition area. The probable addition of a crossing site appears to be the only impact to Knox County Highway #22 that would result from surface mining in the petition area.

The second segment haul of Mid State coal, from processing plant to customer, would remain virtually the same whether the petition area was open to mining or not. Approximately one dozen coal trucks a day would continue to use Knox County Highway #22 to access the processing plant, with only a portion using that route to return home, certain days of the week. Therefore, it appears that the only structural change in the transportation system of the study area would be the installation of one or more crossing sites and as a result coal haulage traffic crossing Knox County Road #22. There would be no significant change in the volume of commercial coal-hauling

trucks traveling along Knox County Highway #22, and road surface conditions would only be altered at crossing sites. The level of safety associated with all roads adjacent to the petition area would probably remain at the current level.

In summary, any alteration of the existing transportation resources would require the approval of appropriate governing officials and the posting of bonds. Mining the petition area is not likely to have an adverse impact on road conditions or road safety in the study area.

Impacts on Land Use Plans

Two levels of land use plans will be discussed in this section. First the three regional land use plans mentioned in the petition will be addressed. These plans were the Knox County Soil and Water Conservation District Soil Erosion and Sediment Control Program and Standards, the Illinois Water Quality Management Plan, and the Illinois Groundwater Protection Act. This will be followed by a discussion of the impacts on local current land use and land use plans.

Although the 1981 Knox County SWCD Soil Erosion and Sediment Control Program and Standards document makes little specific reference to mining, the SWCD Board has recently passed two motions defining its position on further mining in the petition area. In a recent meeting, the SWCD Board stated that the "current method of strip-mining is not compatible with farming or conservation." They also stated that they are not in favor of further mining in the petition area, because "mining provides a good living for one lifetime and destroys opportunities for your farmers for generations" (Knox County Soil and Water Conservation District 1990). In addition, the Knox County SWCD voted at their month meeting in June of 1989 to oppose

permit #227 being submitted at that time for Rapatee Mine by Midland Coal Company.

The Program and Standards also recognizes the need to utilize the land to its best use. Given the high productivity values of these soils, a case could be made that agriculture crop production is their best use. If they were mined they could be returned to crop production after reclamation. The Knox County Soil Survey states that erosion is the major hazard on mined lands whether they have been reclaimed or not. Other problems seen are moderately slow or very slow permeability, compaction and water management.

The Illinois Water Quality Management Plan recognizes the problems created in the past by coal mining without reclamation and the continuing threat to water resources caused by poor mining or reclamation practices. A study by GERPDC and the Southern Illinois Regional Planning and Development Commission (SIRPDC) determined that the majority of mine sites contributing to water quality degradation in the study area resulted from underground mines abandoned prior to more restrictive reclamation laws. The Plan states that potential water quality problems on current surface mining operations should be addressed through the various agencies involved with the permit review and hearing process and an efficient and effective monitoring and inspection system.

In response to Lands Unsuitable for mining designations, the Plan states that;

> "...the emphasis is on the preservation of water quality in water supply and recreational water bodies. Application of significant and effective special control and monitoring measures for acid mine drainage and increased mineralization in reservoir watersheds is considered a viable alternative to a declaration of lands unsuitable for mining in most areas if these special measures are assured." (IEPA DWPC 1985)

The last regional land use plan to be discussed is the Illinois Groundwater Protection Act. This section will not address whether or not the mining of this land could adversely affect the groundwater quality or quantity utilized by the petitioners for personal use or for use in their farming operations as this is discussed elsewhere in the report. Rather the discussion here looks at whether the Groundwater Protection Act addresses the potential impacts mining could have on groundwater resources.

Although the Act does address the impacts of some type of mining, there is no direct reference to coal mining. The Act defines 'potential routes' which are structures or operations which can serve as a conduit or pathway for contaminants to reach groundwater to include "excavation for the discovery, development or production of stone, sand or gravel." Mining for coal resources is not mentioned in this definition.

Throughout the Act no specific mention of coal mining or the results of coal mining activities are mentioned. In fact the definition of waste in the Act excludes products from facilities subject to the Federal Surface Mining Control and Reclamation Act of 1977 (P. L. 95-87).

Although groundwater issues as they pertain to coal mining are not directly addressed in the Act, mine companies receiving a permit from DMM are subject to certain restrictions and regulations as defined in their permit. Should an interruption in the quantity of groundwater or a contamination of groundwater occur as a result of mining, the mining company would be responsible for providing adequate water supplies for those whose service was interrupted.

The discussion will now turn towards the current land use and the planned land use and will only focus on Salem Township. Knox County intends to control land uses within Salem Township and has zoned the majority of the area conservation, their most restrictive zoning designation. Despite this the county does not have the authority to deny a request to mine an area based solely on its zoning designation although they are invited to review and comment on any mine applications submitted by a mining company.

Obviously if the area were mined there would be a change in the current land use, at least for the duration of the mining and the reclamation. Through reclamation the land could be returned to its current land use although the length of time needed would depend on the premining land use. The mining of lands previously mined and not reclaimed could result in the reclamation of some areas that, otherwise, may not be reclaimed. Whether or not the prime farmland could be reclaimed to the same productivity level, although an issue, is not addressed in this section. Without a specific mining plan a detailed assessment of impacts to the current land use from mining is not possible.

The mining of the petition area would not be out of character with the surrounding area since much of the area surrounding the petition site has been mined or is being

mined. But the intent of Knox County by zoning the area conservation and agriculture is to preserve it. Their Comprehensive Plan states that zoning regulations are the means by which the land use designations in the plan will be controlled.

Prime farmland protection is one of the highest priorities in the county. They have defined agriculture as their 'most important' land use and listed the protection of these lands as the first fundamental objective spelled out in their land use plan. More land is designated agriculture in their land use plan than any other category.

Conservation and recreation is the second major land use designation in the Comprehensive Plan. It is also addressed by the plans fundamental objectives where it states the need to provide major recreational facilities for the community. Most of the petition area is zoned conservation which is the most restrictive zoning classification, demonstrating the counties desire to control any development or land use changes within the area.

Mining was also addressed by the plan. Although no figures for future mining were given the plan states;

> "The objective of the plan is to limit the area to be strip mined to the maximum extent possible. Strip mining of coal brings but an ephemeral advantage to a few at the cost of a permanent economic, social, and aesthetic loss to the many. Knox County should utilize all possible means to rigorously limit this activity plus insisting that effective measures be undertaken to make the stripped areas as productive as possible."

Even though the Comprehensive Plan is dated, it is still being used by the county and therefore needs to be considered.

CHAPTER XII

SUMMARY OF FINDINGS

A. INTRODUCTION

The allegations contained in the Salem Township of Knox County Petition, submitted by petitioners Terrell, Threw and the Knox County Farm Bureau (Appendix A) were compiled and presented in Table I-1 (pages I 9-11). The concerns of the petitioners are embodied in 21 allegations which are divided into five sections.

A. Allegations related to impacts on existing land use plans or programs.

B. Allegations related to impacts on fragile or historic lands.

C. Allegations related to impacts on renewable resource lands.

D. Allegations related to impacts on the human environment.

E. Allegations related to impacts on socioeconomic resources.

This chapter will summarize the potential impacts that mining may have on existing resources in the area, drawing information from the research and analyses provided in the preceding chapters. Within this context, all petition allegations are addressed by section. Several allegations crosscut more than one section as depicted in Table I-1: each perspective will be examined where possible.

B. ALLEGATIONS

Allegations Related to Impacts on Existing Land Use Plans or Programs.

1) Surface mining operations would be incompatible with existing land use plans, among them: Knox County Soil Erosion and Sediment Control Plan (P.L. 99-1998, PA 132, Food Security Act of 1985, Sec. 540 (e) (4) (11), Sec. 540.24 (d); Illinois Water Quality Management Plan (35 Ill. Adm. Code Part 351); and Illinois State Groundwater Protection Act of 1987 (Il. Rev. Stat., ch. 111 1/2, par. 1001-1052).

The Knox County SWCD Soil Erosion and Sediment Control Program and Standards----This 1981 document makes no direct policy statements concerning future mining in Knox County, although the Knox County SWCD Board has expressed their opinion that "the current method of strip-mining is not compatible with farming or conservation," and that they are not in favor of further mining in the petition area. The Program and Standards recognizes the need to utilize the land to its best use. Given the high productivity values for many of the soils in the petition area, a case could be made that crop production is their best use, whether it is unmined or returned to crop production after reclamation.

The Illinois Water Quality Management Plan----This Plan recognizes the problems created in the past by coal mining without reclamation and the continuing threat to water resources caused by poor mining or reclamation practices. Paraphrasing a response to Lands Unsuitable for Mining designations, the Plan states that if adequate measures are taken to ensure that effects from mining can be treated on site, and do not migrate off site, then this would be preferable to designating an area unsuitable for mining.

The Groundwater Protection Act----Throughout the Act no specific mention of coal mining or the results of coal mining activities are mentioned. Mine companies receiving a permit from DMM are subject to certain restrictions and regulations as defined by their permit. Should an interruption in the quantity of groundwater or a contamination of groundwater occur as a result of mining, the mining company would be responsible for providing adequate water supplies for those with interrupted service.

See Chapter XI Section G for an indepth discussion of impacts on existing land use plans or programs.

Allegations Related to Impacts on Fragile or Historic Lands

2) Tama, Sable and Ipava soils are among the finest soils in Illinois. The ability to restore the physical and chemical characteristics of the soils and overburden identified in the petition to their capability prior to mining has not been demonstrated.

A principle issue in the petition is whether it is technologically feasible to restore the physical and chemical features of soils and overburden to premining conditions. The main barrier to restoring productivity in these soils is related to many soil properties (especially texture and moisture content at the time of handling), and has been addressed at length in Chapter XIE. Although characteristics of the natural soil influence the structure of a reclaimed soil, the method of reclamation largely determines the amount of compaction that will occur. The post-mined soils have a physical condition "dominated by features attributable to the soil construction operation rather than from the influence of natural soil-forming processes". There are several studies which suggest ways to circumvent or alleviate the compaction problem. Some of these methods have proven to be effective in reducing the problem of compaction.

As discussed in Chapter XI, compaction can be circumvented to a large degree if the soil materials are handled while fairly dry and if the traffic by heavy equipment on the rooting media is eliminated, or at least minimized. For example, the bucket wheel excavator-conveyor-spreader system has been shown to be extremely effective at eliminating post-mining compaction problems in southern Illinois. However, this system is inflexible and impractical for most mine sites. Truck hauling systems have

also been devised to reduce compaction of the rooting media as well as the direct cast method being used in western Illinois. Additionally, effective methods are continually being developed and tested for alleviating compaction after it has already occurred. These involve the use of deep tillage devices, some of which can rip the soil to a depth exceeding 100 centimeters. Evidence is mounting on their effectiveness in restoring productivity as well; however, avoidance of compaction is still generally preferred over alleviation after compaction has occurred.

Chemical properties, such as, salinity, alkalinity, concentration of toxins, and organic matter, although potentially important features, are not seriously limiting factors in the petition area, and can be discounted as barriers to restoring productivity under high management conditions.

Insufficient research has been conducted on the soils of the region over long periods of time and encompassing widely varying climatological conditions to unequivocally state whether or not the soil capability can be fully restored following mining. To date, research results are ambivalent with respect to yields on reclaimed prime farmland for the long-term. One can find examples of data on either side of the issue. For example, University of Illinois researchers have found that for five of seven years at the Sunspot Mine in Fulton County, corn and soybean yields were not significantly different between mined and unmined sites. Preliminary data from newer deep tillage plots show impressive results for reducing compaction and thus restoring productivity. Yet, there are also examples where mined land productivity fell far short of unmined soils; it depends on the soil conditions and the reclamation technology used at each particular locality (Jansen and Hooks 1988). Data from reclaimed mine sites are either too short-term nor not specific to the soil conditions of the petition area to assess full restoration potential to date.

3) Sharon Terrell is the owner of historic land and an historic structure which is eligible for listing on the State or National Register of Historic Places. The structure, in the path of the expansion of surface mining, would be adversely effected by the expansion.

The Terrell home has not been the subject of a formal determination of eligibility. However, its history and archaeological potential justify an assessment of such eligibility. Its architectural significance is unclear due to extensive exterior and interior renovations. An adequate assessment requires additional investigation by an architectural historian. Final determination of eligibility requires the opinion of the Historic Sites Advisory Council.

4) There could be potential damage to the structure from blasting at a nearby surface mine.

The Permanent Program Blasting Rules and Regulations (62 Illinois Adm. Code 1816.61 - 1816.68 (1987), provides for buffers around buildings used as dwellings. If any blasting is to take place within 1,000 feet of a dwelling a blast design plan must be submitted to DMM by the mining company and approved by their staff. In addition, all residents within 1/2 mile of the permit area must be notified of the blasting schedule in writing at least 30 days before the initiation of blasting. Residents or owners of a dwelling or structure can request a pre-blast or condition survey of their structure or dwelling to facilitate the determination as to whether any damage could be attributable to blasting or existed prior to blasting at the mine.

5) Potential adverse effects to this historic property would be damage to a tribute to the cultural and esthetic values of Salem Township.

The cultural heritage of the area is summarized as follows. Fifteen of the 24 residential structures remain in the petition area and appear on the 1861 plat map. There may be 38 historical American archaeological sites based on an analysis of plat

maps. This includes only residential structures constructed between 1830 and 1860. The presence of nearby historical Potawatomi villages, increases the potential for unrecognized historical American Indian sites. The Illinois Archaeological Survey site file refers to a single prehistoric American Indian site in the petition area. Mine operations probably destroyed the site. Based on a study of 154 recorded Knox County archaeological sites, Salem Township likely contains primarily Archaic sites situated near water courses in upland settings. There is one cemetery in the petition area-- the Yates City Cemetery. Mid-19th-century grave markers are common in the northeast section of this still active cemetery.

Allegations Related to Impacts on Renewable Resource Lands.

6) Continuing to mine Tama, Sable and Ipava soils will adversely affect renewable resource lands on which mining will result in a substantial loss and reduction of long-range productivity of food production.

To date, our interpretation of available data for western Illinois indicates that it is uncertain whether reclamation techniques are capable of restoring mined prime farmland of western Illinois to a sustained, long-term productivity at 100 percent or greater that those of premined lands. No technology has been shown to guarantee consistent restoration of prime farmland, although evidence from recent technological developments such as deep tillage is very promising. Soil scientists believe that the major problem in restoring row crop productivity in western Illinois is caused by compaction that occurs during the reclamation process. Compacted soils are poorly aerated and slowly permeable, have low nutrient and water capability and restricted root growth. These factors, acting together, accentuate the susceptibility of crops grown on compacted soils to weather stress. Most of the soils can be reclaimed to a high degree of productivity; but to date data are too short-term to project sustained yields long-term.

7) No reclamation of Tama, Sable and Ipava soils has met the criteria for long-term "intensive", "within a reasonable time", return to equivalent yield (productivity) under equivalent levels of management.

The response to allegation 7 is basically redundant to that of allegation 6. The trials referred to in Chapter XI, studies by the University of Illinois, assess corn and soybean yields on restored lands; all use an equivalent (intensive) management and all are "within a reasonable time", if that can be defined as less than ten years. Therefore, the issue at stake is one of restoring productivity, previously addressed.

8) Mining operations could result in a substantial loss or reduction of long-range productivity of water on renewable resource lands.

9) Surface coal mining the prime soils specific to the area identified would irreparably harm the hydraulic balance and diminish water quality and quantity of the affected and adjacent areas.

10) Surface mining operations would adversely affect the quality and quantity of the petitioner's water flows causing damage to essential hydrologic function.

11) Substantial loss or reduction of the long-range productivity of the aquifers and recharge areas that supply properties in the petition area.

Surface Water Quality----Stream water in this portion of the state is normally high in iron due to geologic conditions. Records indicate that iron content is not increased further by surface mining activities. Total dissolved solids are generally not increased after reclamation if limestone overburden is present. The high alkalinity and pH values for Littlers Creek indicate that the limestone overburden is present (see Chapter XID and V).

Groundwater Quality----The water quality of the bedrock aquifers of this area would be less likely to be affected by surface mining than would the water quality of the

shallow unconsolidated spoil materials. The mining process may produce some vertical flow gradients to the upper Pennsylvanian bedrock; however, the number and magnitude of influence of these gradients will be dependant upon its geologic make-up and the mining processes used. Although we have no record of this uppermost bedrock being used for domestic water supplies within the petition area, its water quality may be affected. The degree of this affect will depend upon the chemical makeup and the buffering capacities of the spoil. The deeper limestone aquifers which are being used for domestic water supplies in this area appear to be protected by deep and thick sandstone and shale units. The water quality of these limestone formations will depend mostly upon the chemical composition of those units and those directly surrounding them rather than on infiltration of shallow subsurface groundwater located directly above them.

Available information suggests that the quality of groundwater in the resultant spoil aquifer within the petition area would be adversely affected by surface mining. Based on a comparison with available data, those constituents most likely to be adversely impacted are total dissolved minerals and sulfate. Concentrations of iron and alkalinity would be altered, and elevated concentrations of trace metals could also be present. It is also likely that the hardness of the groundwater after reclamation would elevate because of the increased opportunity of calcium and magnesium to dissolve into solution.

Groundwater Resources--When mining ceases and reclamation begins, the composition of the replacement materials (or spoil) determines the groundwater hydraulics in the reclaimed area (Gibb and Evans 1978). Impacts associated with the reclamation result from hydraulic parameters which differ from those of premining conditions. Several geohydrologic characteristics have a high potential for impacts

from surface mining practices. Those which are most important in terms of groundwater availability are the hydraulic conductivity, the transmissivity, and the porosity of the resultant aquifer or spoil.

In the worst-case situation in which hydraulic conductivity values decrease in a "spoil aquifer," it is likely that the saturated thickness of the area will increase as a result of the surface mining of the shallow bedrock for the coal. This would suggest that the transmissivity could remain relatively constant in this situation. However, if the hydraulic conductivity were to increase, the saturated thickness would most likely also increase (because of mining of the bedrock), and this situation would induce a corresponding increase in transmissivity.

Surface mining of an area will impact the geohydrologic flow characteristics of the area. Several studies indicate that the impacts to the geohydrologic properties due to mining may result in either increases or decreases in the groundwater availability at a site. These studies also indicate that the geohydrologic flow characteristics may even remain very similar to those of premining conditions. The determining factor will be the geologic makeup of the spoil material which will be used for reclamation. The extent of this impact can be determined only by post-mining testing.

Because recharge involves the downward percolation of water, the effects on groundwater recharge of the petition area will be most directly influenced by the hydraulic properties associated with the site reclamation. In most situations, mine spoil aquifers transmit groundwater at least as readily as the strata replaced, thus acting more as conduits than as barriers to groundwater flow. If hydraulic conductivity values increase as a result of the spoil aquifer, the impacts of increased

transmission of water are expected to be beneficial, except where groundwater of undesirable quality is generated (National Research Council 1981).

Once surface mining operations have been completed, changes in groundwater quantity usually develop. The changes result from the alteration of the geohydrologic characteristics of the area (Cartwright et al. 1981). As discussed in Chapter IX of this report, a mine spoil aquifer will be created. In a regional context, this whole area could act as a high groundwater flow-through area if increased hydraulic conductivities of the spoil aquifer exist. This would allow a greater availability of groundwater to wells finished within these materials.

In summary, if the petition site is surface-mined, local groundwater flow patterns will be temporarily affected. The extent and duration of this effect would depend upon the specific topographic and geologic configuration of the site after reclamation. The geologic configuration of the spoil will also play an important role in influence to the hydrogeologic parameters of this site which govern flow (i.e., hydraulic conductivity, transmissivity, and porosity). These parameters as well as groundwater quality will be altered as a result of mining (see Chapter XID for further discussion).

12) Petitioner Terrell is dependent upon the well on her property as a domestic water supply. If surface mining operations are permitted, there will be a potential interruption in petitioner Terrell's water supply.

Within the mined areas, the changes in hydraulic conductivity and saturated thickness imply that there may be more water in storage after mining than before. Whether this water will be readily available will be dependent upon the geologic makeup of the spoil material. This fact may be of little consequence, however, because the quality of shallow groundwater in the affected area might not meet drinking water standards

after reclamation. Comparisons of tables XI-1, XI-2 and XI-3 indicate that the water quality of the spoil aquifer created by the mining process will most likely be poor (but still usable) in relation to that in unmined areas. These tables also indicate that the areas adjacent to the mine will exhibit similar water qualities. (It must be noted; however, that these analyses were conducted primarily upon preregulation sites). However, it may be possible that groundwater quality may increase over time in the mined area (Gibb and Evans 1978).

Based upon available topographic information, some areas within and around the proposed mining site have ben mined previously. There are records of domestic water supplies located within and around thee areas (Appendix B; Map 21 Well Locations). This would indicate that post-mining domestic water demands can be met through use of ether shallow wells finished within the unconsolidated materials, or from bedrock well systems. However, any water quality or quantity problems associated with these wells are not known.

In conclusion, the total area of the aquifer capable of meeting groundwater demand might be reduced, because the mined areas might produce groundwater of insufficient quality (for domestic use) from the large-diameter bored-well(s) present in this area. This type of well will also most likely experience a temporary loss of supply as a result of dewatering practices at the mine site. The extent of this loss will depend upon the proximity of the dewatered areas to the well. It appears that this are is likely to be capable of responding to the groundwater demand after reclamation. However, available information also suggests that the groundwater quality of this site after reclamation will be degraded (See Impacts on Groundwater Quality in Chapter XI for a more detailed discussion.) The extent of degradation will depend upon the geologic makeup of the spoil, upon the reclamation process used at the site, and upon the

intended use of the water. Any impacts associated with water well use in this area is dictated to be handled by the mining company. Under current mining regulations, a mining company is required to furnish a comparable (to premining conditions) water supply to any individual impacted by the mining activity.

Allegations Related to Impacts on the Human Environment

13) Burning the high sulphur coal found on the petition site would adversely affect health and the human environment.

The quality of the Springfield and Herrin Coals in the petition area is typical of these coals as they occur elsewhere. Both are high sulfur coals, which by conventional definition, are coals containing more than about 1 percent sulfur by weight (dry). However, Illinois coal with less than about 2.5 percent sulfur is commonly referred to as "relatively low sulfur coal." Clean coal from the Rapatee Mines has an average sulfur content of 2.53 percent (3.05%, dry) for the Springfield Coal over last two years of operation (Table III-3). Analyses of the total sulfur of clean coal from the Elm Mine show a content of 3.00 percent (3.06% dry) for the Herrin Coal. The values for the Herrin Coal are an average of five samples from the Elm Mine retrieved from the Illinois State Geological Survey Coal Information System (Table III-3). Based on these average sulfur contents, the potential sulfur dioxide emissions from burning coal produced from the petition area are estimated to range from 4.84 to 5.67 ponds per million British thermal units (lb/MBtu).

Illinois has set air quality standards for six air pollutants: total suspended particulate matter (TSP), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), and lead (Pb). The state monitors atmospheric concentrations of

these pollutants at many locations throughout the state. The only one of these likely to be affected by surface mining operations is TSP.

Concentrations of suspended particulate matter could well be increased by wind erosion of exposed soil, and by dust generated from various mining operations. Since many parameters have not been specified for the petition area, it is not possible to estimate quantitatively the effects on airborne dust concentrations. It is estimated, however, that visibility could be severely reduced under conditions of high wind speeds and dry bare soils. The area affected by this severely reduced visibility would be restricted to only a few hundred feet downwind of the area of active emissions (see Chapter XIC).

14) Surface mining operations and the resultant heavy coal hauling traffic past Sharon Terrell's place, will substantially endanger her and her family, denying them their rights to a safe and healthful environment under Article VI of the Constitution of Illinois.

15) The historic structure in question is open to the public for house tours on a periodic basis. Visitors to a house tour who park their vehicles along the roadway are subject to the danger of swiftly passing coal truck traffic.

Transportation of Mid State coal from mine to customer involves two shipping segments: 1) from pit to Rapatee Mine's processing plant, and 2) from processing plant to customer. Opening the petition area to mining would only impact the first segment. Existing private haulage roads would most likely be extended into the petition area. This would probably require crossing Highway #22, and as with all crossing sites, would need to be approved beforehand by governing officials and bonds posted where required. Haulage of coal from the pit is generally done during the week, occasionally on Saturday, but never on Sunday or holidays. Accident data do not reveal that the current crossing site on Route 116 is a particularly hazardous area.

The second segment would remain the same whether the petition area was open to mining or not. Approximately one dozen coal trucks a day would continue to use Highway #22, with only a portion using that route to return home, certain days of the week. The level of safety associated with all roads adjacent to the petition area would probably remain at the current level (see Chapter XIG).

<u>Allegations Related to Impacts on Socioeconomic Resources</u>

16) The difference between economic value of farm operations before mining, and economic value of farm operations after mining of Tama, Sable and Ipava soils reclaimed under the "highest standard of Reclamation" to reclaimed soil Rapatee 872B is diminished income.

Productivity indices and crop yields are valid parameters for measuring the productivity of a soil. The extension of productivity and yields are translated directly into economic worth. The overall weighted mean productivity index for the petition area is 118, which is a very high index considering the area as a whole. When only the soils of the petition area currently under cropland are considered, the weighted mean productivity index is 142, a very high value indeed. Ipava soils account for 13 percent of the petition area and have the highest productivity index (160). Tama soils, the most extensive soil type in the petition area (nearly 42%) have productivity indices which range from 135 to 149 at high levels of management (see Chapter VIC). Yield estimates for various crops and timber on soils found at the petition site illustrate a clear discrepancy between Tama, Sable and Ipava soils and reclaimed Rapatee 872B. The estimated yields for all crops represented are substantially higher for the Tama, Sable and Ipava group (see Table 4 Appendix E).

A definitional problem arises, however. Rapatee soils are categorized by the Soil Conservation Service as those soils resulting from post-mining reconstruction process. As such, all soils, regardless of the condition of the premined soil and regardless of the post-mining construction methodology (as long as the legal requirements for topsoil and subsoil replacement and returning original contour to the post-mining landscape are met), are lumped into the Rapatee series. Therefore, the variability of the productivity index, and any other soil attribute, is extremely high within the Rapatee series. It is therefore quite meaningless to arbitrarily apply one productivity index number to the whole Rapatee series. Nonetheless, an "average" index of 105 has been applied by the Soil Conservation Service and the index for Rapatee is substantially lower than those of Tama, Sable and Ipava soils (all greater than 150).

17) The benefits farmers obtain from USDA programs on reclaimed soil Rapatee 872B, are less than benefits on unmined Tama, Sable and Ipava soils.

USDA programs distribute funds on the basis of soil capability. Because payment through these programs are based on yields, any measure that decreases productivity is reflected in benefits. USDA crop insurance does not cover crops grown on mined or reclaimed land (see response to allegation 16 for productivity and yield determinations).

18) Surface mining of Tama, Sable and Ipava soils reclaimed to the "highest standard of reclamation" Rapatee 872B, do not maintain the Knox County property tax base.

19) Surface mining of Tama, Sable and Ipava soils reclaimed to the "highest standard of reclamation" Rapatee 872B, results in 1/2 the tax assessment valuation of unmined Tama, Sable and Ipava soils.

20) Surface mining of Tama, Sable and Ipava soils reclaimed to the "highest standard of reclamation" Rapatee 872B, results in 1/2 the real estate appraisal value of unmined Tama, Sable and Ipava soils.

Any plan for surface mining operations in the Salem Township petition area would involve the transfer of farm and non-farm land holdings between a number of private owners and Mid State. During mining, these land transfers would not affect the tax assessment valuation or concurrent property tax revenues of Knox County. Effected land would be assessed at its present "Equalized Assessed Valuation" (EAV). After mining and reclamation, reassessment likely will result in reduced EAV, causing decreases in tax assessment valuation and the permanent loss of property tax revenues.

Any farmland acreage with a productivity greater than that for Rapatee soil would, post-mining be at a lesser productivity; any cropland more productive than Rapatee soil also has a greater EAV than Rapatee's $144 per acre (see Chapter X, Table 20 for a list of EAV's ($'s/acre)for soils with a greater EAV than Rapatee 872). The EAV per acre of Tama, Ipava and Sable soils are $277 (Tama 36B), $244 (Tama 36B2), $317 (Ipava), and $297 (Sable).

There are approximately 3,950 acres of land with EAV's greater than that for Rapatee 872B within the petition area. All these acres will likely not be disturbed, but best available information suggests that potentially disturbed cropland would be between 3,100 and 3,500 acres. Using the 3,950 figure, however, will provide an estimate of the maximum possible impact. If all these acres are mined and restored to Rapatee soil, a loss of assessed value would be equal to the summation of the lost assessed value for each soil type present (see Chapter X for calculations). In total then, the maximum of approximately $488,238 in EAV would be lost per year should all these soils and acreage be disturbed by a surface mine. The maximum possible property

tax revenue loss for Knox County would be $30,000 per year (see Chapter X Property Tax Revenue).

21) The impacts of coal hauling traffic would overwhelm usage of Knox County Highway #22, causing a breakdown and deterioration of the road serving farmers.

Approximately one dozen coal trucks a day would continue to use Knox County Highway #22 to access the processing plant, with only a portion using that route to return home certain days of the week. It appears that the only structural change in the transportation system of the study area would be the installation of one or more crossing sites and as a result, coal haulage traffic crossing Knox County Road #22. There would be no significant change in the volume of commercial coal-hauling trucks traveling along Knox County Highway #22, and road surface conditions would only be altered at crossing sites.

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APPENDIX A

THE SALEM TOWNSHIP OF KNOX COUNTY PETITION

ILLINOIS DEPARTMENT OF MINES AND MINERALS
Richard R. Shockley
Director

LAND RECLAMATION DIVISION
300 WEST JEFFERSON STREET - SUITE 300
P.O. BOX 10197
SPRINGFIELD, ILLINOIS 62791-0197
TELEPHONE: (217) 782-4970

October 24, 1989

Mr. Tim Johnson
Department of Energy and Natural Resources
325 West Adams Street
Springfield, Illinois 62706

Dear Mr. Johnson:

Re: Lands Unsuitable for Mining Petition No. LU-003
Salem Township, Knox County, Illinois

On September 5, 1989, the Illinois Department of Mines and Minerals received a revised Lands Unsuitable for Mining Petition submitted by Sharon Terrell, Egbert Threw and the Knox County Farm Bureau concerning the Salem Township of Knox County, Illinois (Petition). Pursuant to 62 Ill. Adm. Code 1764.15(a)(1), the Department has concluded its initial processing of the Petition and has determined that such Petition is complete.

The Department's regulations at 62 Ill. Adm. Code 1764.15(c) require that, within ten (10) days after a petition is determined to be complete, the petition be referred to your agency for ensuring the preparation of the Land Report. The Department requests that your agency initiate required action to ensure preparation of the required Land Report as detailed in 62 Ill. Adm. Code 1764.15(c). A copy of the petition is enclosed for your use.

Should you have any questions regarding this petition please contact myself or Ralph Harnishfeger at the phone number and address above.

Sincerely,

Paul J. Ehret

Paul J. Ehret, Supervisor
Land Reclamation Division

PJE:RH:lb
cc: S. Terrell
E. Threw
Knox County Farm Bureau
Knox County Clerk
Midland Coal Company
Marion Field Office
OSMRE

KNOX COUNTY FARM BUREAU

Serving Farmers Since 1918

TELEPHONE 309/342-2036, 180 SOUTH SOANGETAHA ROAD, GALESBURG, ILLINOIS 61401

August 28, 1989

RECEIVED
SPRINGFIELD
SEP 5 1989
DEPT. OF MINES AND MINERALS
LAND RECLAMATION DIV.

Mr. Paul Ehret, Supervisor
Illinois Department of Mines and Minerals
300 West jefferson Street, Suite 300
Springfield, Illinois 62791-0137

Resubmittal

Dear Mr. Ehret:

RE: Lands Unsuitable for Mining Petition NO. LU-003
Salem Township, Knox County, Illinois

The packet accompanying this letter contains affidavits fro ...s Egbert Threw and Sharon Terrell of 104 Gold Street and RR 1 of F... ...gton, IL., demonstrating a specific injury that can be traced to the surface mining of lands identified in Petition No. LU-003, as requested to me in your letter of August 16, 1989.

The Petitioners allege a distinct and palpable injury, the loss of the quality and quantity of water sources on their lands. Clearly the Petitioners are among the parties sought to be protected by the Surface Mining Control and Reclamation Act of 1977, and are squarely within the Acts' "zone of interests".

The affidavits provide sufficient details describing threatened injuries. The affiants live in the area where surface mining operations have occured and where they are anticipated to commence.

The affiants allege past environmental degradation to the area but also described in substantial detail and with precision the injuries they fear from future mining operations.

The affidavits contain allegations of real people personally concerned about constitutionally sufficient environmental injuries. Their concerns are not remote and speculative. Their allegations address the regulations that implement the important requirement that hydrologis safeguards protect the quality and quantity of their water supplies. The petitioners want guarantees that the present quality and quantity of their water sources will remain fresh and pure and continue as long as needed.

PETITION FOR UNSUITABLE

Table of Contents

KNOX COUNTY FARM BUREAU

Serving Farmers Since 1918

TELEPHONE 309/342-2036, 180 SOUTH SOANGETAHA ROAD, GALESBURG, ILLINOIS 61401

July 20, 1989

Richard Shockley
Illinois Dept. of Mines and Minerals
Suite 300
300 West Jefferson Street
Springfield, Illinois 62791-0197

Dear Director Shockley,

Enclosed is a Petition submitted to the Illinois Department of Mines and Minerals by Sharon Terrell, Egbert Threw and the Knox County Farm Bureau, pursuant to Section 522 (c) of the Surface Mining Control and Reclamation Act of 1977.

This Petition requests that the Illinois Department of Mines and Minerals as the Regulatory Authority for the Act in Illinois, designate certain lands in Salem Township in Knox County, Illinois as Unsuitable for Surface Coal Mining operations.

All correspondence concerning this Petition should be addressed to:

Sharon Terrell
RR 1
Farmington, IL
61531
309) 358-1171

Egbert Threw
104 Gold St.
Farmington, IL
61531
309) 245-2130

Dennis Hartung, Mgr.
Knox County Farm Bureau
180 South Soangetaha Road
Galesburg, IL 61401
309) 342-2036

Very truly yours,

Joe Murdock, Pres.

Joe Murdock, President
Knox County Farm Bureau
Galesburg, Illinois 61401

JM:DH:

A

PETITION

to DESIGNATE

CERTAIN FARMLANDS,

Tama, Ipava, and Sable Soils

as UNSUITABLE for SURFACE COAL MINING

Re: PL 95-87, Sec. 522 (c)

30 USC 1272 (c)

96½ Ill. Rev. Stat. 7907.01
7907.02
7907.03
7907.04

LOCATION: Knox County, Illinois, T-9-N R-4-E

Sections 13, 14, 15, 16, 21 (N½, SE¼)
22, 23, 27, 28 (NE¼), 34, 35

SALEM TOWNSHIP

PRESENTED TO: Illinois Department of Mines and Minerals
Suite 300, 300 West Jefferson Street
Springfield, IL 62791-0197

BY: Sharon Terrell, RR 1, Farmington, IL 61531

Egbert Threw, 104 Gold St., Farmington, IL 61531

Knox County Farm Bureau
180 South Soangetaha Road, Galesburg, IL 61401

Joe Murdock, President
Dennis Hartung, Manager

STATE OF ILLINOIS

ILLINOIS DEPARTMENT OF MINES AND MINERALS

In the Matter of	)	
	)	
Designating Certain Farmlands Tama, Sable, Ipava soils	)	
in Salem Township, Knox County, Illinois	)	PETITION
	)	
Sections 13, 14, 15, 16, 21 (N½, SE¼) 22, 23, 27, 28 (NE¼), 34, 35	)	
	)	
as Lands Unsuitable for Surface Mining	)	

PART A: INTRODUCTION

1. Sharon Terrell, Egbert Threw, and the Knox County Farm Bureau, Inc., on their own behalf and on behalf of Knox County Farm Bureau members, do hereby Petition the Illinois Department of Mines and Minerals (IDMM), to Designate certain farmlands in the Township of Salem, in Knox County, Illinois, as Unsuitable for Surface Coal Mining.

The preservation of these farmlands in Salem Township, Knox County, Illinois, in their present state of agricultural productivity is necessary to protect the important agricultural farmland resource found there in abundance. The survival of the agricultural economy in Knox County is paramount to the well-being of its citizens. The survival of the food base must be assured if generations of human beings to come are to survive in perpetuity.

The above named area is unique, rich in fertile Tama, Ipava, and Sable soils; surface and underground water resources; and the good transportation system necessary to the commerce of the Knox County farm community. The area is underlain with an aquifer contiguous to the cities of Yates City and Farmington, the surrounding countryside, and to other communities in West Central Illinois.

Petitioners believe that irreparable damages of loss of soil productivity, water quality and quantity and loss to the county tax base and damage to an historical site will be caused by surface mining operations in the area identified in this Petition. Petitioners allege that surface mining operations in the area identified in this Petition would not be in their best interests, nor in the best interests of other landowners and taxpayers in Knox County.

The designation of Lands Unsuitable for Surface Coal Mining is sought under the Surface Mining Control and Reclamation Act of 1977, 30 USC 1201 et. seq. (ACT), and implementing regulations promulgated by the Office of Surface Mining (OSM), 30 CFR 700 et. seq., the National Environmental Policy Act of 1969, 42 USC 4321 et. seq., (NEPA), and the Constitution of Illinois, Article XI, Chpt. 96½ Ill. Rev. Stat. 7901.01 and 62 Ill. Adm. Code 1700 et. seq, 35 Ill. Adm. Code, Part 351, and Chpt. 111½ Ill. Rev. Stat. 1001-1052,

2. Available data strongly suggests that A) The affected area identified in the Petition could not be reclaimed after surface mining operations to the capability that existed prior to coal mining operations; B) Surface coal mining operations would seriously damage the many acres of fragile and renewable resource lands identified in this Petition resulting in a substantial loss or reduction of long-range productivity of food and fiber products; C) Surface mining operations would adversely affect the quality and quantity of the Petitioners water flows causing damages to essential hydrologic functions; D) Surface mining operations would result in a substantial loss or reduction in water flows recharging the area and a 20 mile radius; E) Surface mining operations would adversely damage and/or destroy the historic high site property eligible for listing on the National Register of Historic Places located within the area; F) Surface mining operations would reduce the many acres of prime farmland on the Knox County Property Tax Assessment Record to a lesser valuation

causing an unfair increase in the Petitioners and other land owners taxation rates; G) Surface mining reclamation operations on the Tama, Ipava and Sable soils identified in this Petition would not be technologically and economically feasible; H) Surface mining operations would not be compatible with existing local land use plans.

3. Petitioners seek this designation under the following provisions of the ACT and its Regulations which protect certain lands from surface coal mining operations when:

(A) Certain lands cannot be reclaimed in accordance with the requirements of the ACT.

30 USC 1265 (b)(2)
30 CFR 810.2 (c)
Chpt. 96½ Ill. Rev. Stat. 7903.03

(B) Operations would result in loss and/or reduction of an historic property.

30 USC 1272 (a)(3)(B)
30 CFR 762.11 (b)(2)

(C) Operations could result in loss and/or reduction of long-range productivity of water supplies including damage to aquifers and aquifer recharge areas of land now supporting agricultural activity.

30 USC 1272 (a)(3)(C)
30 CFR 762.11 (b)(3)
Chpt. 96½ Ill. Rev. Stats. 7901.02 & 7903.10 (f)

(D) Operations would result in loss and/or reduction of consistant long-range productivity of supplies of food and fiber.

30 USC 1272 (a)(3) (C)
30 CFR 762.11 (b)(3)
Chpt. 96½ Ill. Rev. Stat. 7901.02

(E) Operations would deprive the Petitioners and other Knox County Taxpayers of their Constitutional rights of fairness in the taxation process.

30 USC 1202 (a)
30 CFR 810.2 (a)
Chpt. 96½ Ill. Rev. Stat. 7901.02

4. Permit Application # 227 was filed with the Clerk of Knox County, IL., by the Midland Coal Company, Farmington, IL., on March 15, 1989, requesting a permit to surface mine 368 acres of land in Section 20, 21, 28 and 29, T-9-N, R-4-E, in Knox County. The filing of the application indicates that an imminent potential exists for surface coal mining operations to be permitted by the IDMM in Salem Township.

A spokesman for the Midland Coal Company declared publicly at a Public Meeting April 6, 1989, in the Knox County Court House that if Permit Application # 227 is permitted, the company plans to expand operations in an easterly and southeasterly direction onto land identified in this Petition.

Petitioners allege that surveying and exploratory drilling for coal has already charted the coal producing potential of the area.

To the best of their ability, Petitioners find no contract or leasehold for the high sulfur coal under the farmlands identified in this Petition and that no local utility generating electrical service is served by coal from the Midland Coal Company.

Alternative sources of low sulfur coal supplies are available elsewhere to any utility servicing the local or surrounding area.

Based upon extensive research and analysis of private and governmental agencies, the Petitioners conclude that a combination of alternative energy sources exist which could provide an energy source without irreparably damaging the many acres of farmland and historic farmstead in Knox County identifies in this Petition.

The Act and its Regulations, PL 95-87, Sec. 522 (a) (4) (c), 30 USC 1272 (d), and NEPA 42 USC 4332 (2) (E); 40 CFR 1501 (3) (c) and 1507.2 (d), require a "study" "to develop and describe" these alternatives in considering this Petition, 62 Ill. Adm. Code 1764.15 (c).

Petitioners request timely and proper consideration of this Petition alleging that surface mining operations conducted on the soils identified in this Petition and near the historic property so identified will seriously affect their best interests.

Part B: Regulations for Petitions to Designate Lands Unsuitable for Surface Mining

Section 1701.Appendix A Definitions

As used in 62 Ill. Adm. Code 1700 - 1850, the following terms have the specified meanings, except when another meaning is given:

Person means an individual, Indian tribe when conducting surface coal mining and reclamation operations on non-Indian lands, general partnership, limited partnership, business trust association, society, joint venture, joint stock company, firm, company, corporation, cooperative or other business organization or any agency, unit, or instrumentality of Federal, State or local government including any publicly-owned utility or publicly-owned corporation of Federal, State or local government;

Person having an interest which is or may be adversely affected or Person with a valid legal interest shall include any person:

Who uses any resources of economic, recreational, esthetic, or environmental value that may be adversely affected by coal exploration or surface coal mining and reclamation operations or any related action of the Secretary or the Department; or

Whose property is or may be adversely affected by coal exploration or surface coal mining and reclamation operations or any related action of the Secretary or the Department.

Section 1764.13 Petitions

a) Right to petition. Any person having an interest which is or may be adversely affected has the right to petition the Illinois Department of Mines and Minerals (Department) to have an area designated as unsuitable for surface coal mining operations, or to have an existing designation terminated. For the purpose of this action, a person having an interest which is or may be adversely affected must demonstrate how he or she meets an "injury in fact" test by describing the injury to his or her specific affected interests and demonstrate how he or she is among the injured.

b) Designation. The Department shall determine what information must be provided by the petitioner to have an area designated as unsuitable for surface coal mining operations.

1) At a minimum, a complete petition for designation shall include:

A) The petitioner's name, address, telephone number, and notarized signature;

B) Identification of the petitioned area, including its location and size, and a U.S. Geological Survey topographic map outlining the perimeter of the petitioned area;

C) An identification of the petitioner's interest which is or may be adversely affected by surface coal mining operations, including a statement demonstrating how the petitioner satisfies the requirements of subsection (a);

D) A description of how mining of the area has affected or may adversely affect people, land, air, water or other resources, including the petitioner's interests; and

E) Allegations of fact and supporting evidence, covering all lands in the petition area, which tend to establish that the area is unsuitable for all or certain types of surface coal mining operations, pursuant to specific criteria of Sections 7.02(a) and (b) of the Surface Coal Mining Land Conservation and Reclamation Act (Ill. Rev. Stat. 1983, ch. 96 1/2, pars. 7907.02(a) and (b)) (State Act), assuming that contemporary mining practices required under applicable regulatory programs would be followed if the area were to be mined. Each of the allegations of fact should be specific as to the mining operation, if known, and the portion(s) of the petitioned area and petitioner's interests to which the allegation applies and be supported by evidence that tends to establish the validity of the allegations for the mining operation or portion of the petitioned areas.

2) The Department may request that the petitioner provide other supplementary information which is readily available.

Part C: Regulations for Criteria for Designation of Lands Unsuitable for Surface Mining

Section 1701.Appendix A Definitions

As used in 62 Ill. Adm. Code 1700 - 1850, the following terms have the specified meanings, except when another meaning is given:

Fragile lands means geographic areas containing important natural, ecologic, scientific or esthetic resources that could be damaged or destroyed by surface coal mining operations. Examples of fragile lands include valuable habitats for fish or wildlife, critical habitats for endangered or threatened species of animals or plants, uncommon geologic formations, National Natural Landmark sites, areas where mining may cause flooding, environmental corridors containing a concentration of ecologic and esthetic features, areas of recreational value due to high environmental quality, and buffer zones adjacent to the boundaries of areas where surface coal mining operations are prohibited under Section 7.01 of the State Act (Ill. Rev. Stat. 1983, ch. 96 1/2, par. 7907.01) and 62 Ill. Adm. Code 1761.11, if these areas have characteristics requiring additional areal protection or if the buffer zone itself contains fragile resources.

Historic lands means important historic, cultural, and scientific areas that could be be damaged or be destroyed by surface coal mining operations. Examples of historic lands include archaeological and paleontological sites, National Historic Landmark sites, sites listed on or eligible for listing on a State or National Register of Historic Places, sites having religious or cultural significance to native Americans or religious groups or sites for which historic designation is pending.

Renewable resource lands means aquifers and areas for the recharge of aquifers and other underground waters, areas for agricultural or silvicultural production of food and fiber, and grazing lands.

Natural hazard lands means geographic areas in which natural conditions exist which pose or, as a result of surface coal mining operations, may pose a threat to the health, safety or welfare of people, property or the environment, including areas subject to landslides, cave-ins, large or encroaching sand dunes, severe wind or soil erosion, frequent flooding, avalanches, and areas of unstable geology.

Section 1762.11 Criteria for Designating Lands as Unsuitable

a) Upon petition, an area shall be designated as unsuitable for all or certain types of surface coal mining operations, if the Department determines that reclamation is not technologically and economically feasible under the Surface Coal Mining Land Conservation and Reclamation Act (the State Act), and these regulations.

b) Upon petition, an area may be (but is not required to be) designated as unsuitable for certain types of surface coal mining operations, if the operations will:

1) Be incompatible with existing State or local land use plans or programs;

2) Affect fragile or historic lands in which the operations could result in significant damage to important historic, cultural, scientific, or esthetic values or natural systems;

3) Affect renewable resource lands in which the operations could result in a substantial loss or reduction of long-range productivity of water supply, or of food or fiber products; or

4) Affect natural hazard lands in which the operations could substantially endanger life and property, such lands to include areas subject to frequent flooding and areas of unstable geology.

Section 1762.13 Land Exempt From Designation as Unsuitable for Surface Coal Mining Operations

The requirements of this Part do not apply to:

a) Lands on which surface coal mining operations were being conducted on the date of enactment;

b) Lands covered by a permit issued under the Act; or

c) Lands where substantial legal and financial commitments in surface coal mining operations were in existence prior to January 4, 1977.

Part D: Statement of Issues

1. The basic concept underlying the purpose and goal of the Surface Mining Act is:

   "General performance standards shall be applicable to all surface coal mining and reclamation ... and shall require the operator at a minimum to restore the land affected to a condition capable of supporting the uses which it was capable of supporting prior to any mining ..."

   The Act: 515 (b) (2)
   30 USC 1265 (b) (2)
   96½ Ill. Rev. Stat. 7903.03
   62 Ill. Adm. Code 1810.1 (c)
   1816.133
   1823.2

2. Neither in the statute nor in a regulation is the word "capable" per se defined; nor is any category specifically identified as an area of measurement of "capable" as "capable" relates to "general" "minimum standard" for restoration of all land.

   Only for "prime farmland" is a special category of capability identified; that special category of capability is "yield," a requirement beyond that for all land.

   Thus, there are no grounds for exclusion of any "capability" that existed prior to mining as being not applicable as a measure of "capability" to all land.

   This means that in whatever category land was capable before mining and however land was capable before mining, the land must be capable after mining.

   Therefore, this general, minimum capability standard for all land after mining means a requirement to restore:

   (a) Capability of land to function after mining as it functioned before mining.

   (b) Capability of land to maintain tax base after mining at same level as existed before mining.

   (c) Capability to provide farmers who farm the land after mining to be able to make as profitable an income on that land as before mining.

   (d) Capability to restore hydrological balance after mining to condition that existed before mining.

Statement of Issues continued

3. Beyond minimum, general, standard for all land is an additional requirement for Issuing a Permit to mine on Prime Farmland:

   " ...if the area proposed to be mined contains prime farmland ... the regulatory authority shall, after consultation with the Secretary, and pursuant to regulations issued hereunder by the Secretary of Interior with the concurrence of the Secretary of Agriculture, grant a permit to mine on prime farmland if the regulatory authority finds in writing that the operator has the technological capability to restore such mined area, within a reasonable time, to equivalent or higher levels of yield as non-mined prime farmland in the surrounding area under equivalent levels of management and can meet the soil reconstruction standards ..."

   The Act: 510 (d) (1)
   30 USC 1260 (d) (1)
   96½ Ill. Rev. Stat 7902.08 (b)
   62 Ill. Adm. Code 1785.1
   1785.17 (d) and (e)

4. Requirement for Bond Release on Prime Farmland:

   " ... soil productivity for prime farmlands has returned to equivalent levels of yield as nonmined land of the same soil type in the surrounding area under equivalent management practices ... "

   The Act: 519 (c) (2)
   USC 1269 (c) (2)
   96½ Ill. Rev. Stat 7906.08 (d) (2)
   62 Ill. Adm. Code 1800.40 (c) (2)

5. Requirement for Designation of Lands Unsuitable for Surface Coal Mining:

   "Upon petition ... the State regulatory authority shall designate an area as unsuitable for ... surface coal mining operations if the State regulatory authority determines that reclamation pursuant to the requirements of this Act is not technologically and economically feasible." (emphasis added)

   The Act: 522 (a) (2)
   30 USC 1272 (a) (2)
   96½ Ill. Rev. Stat. 7907.02
   Note: 62 Ill. Adm. Code 1762.11 (a) contradicts (b)
   1762.11 (b) contradicts (a)

Statement of Issues continued

5. (continued)

Both the Federal Statute and the State Statute and the Illinois Regulation 62 Ill. Adm. Code 1762.11 (a) concerning Designation of Lands Unsuitable for Mining says "shall designate..."

In contradition, Illinois Regulation 62 Ill. Adm. Code 1762.11 (b) substitutes "may be, (but is not required to be) designated."

Hence, that Illinois Regulation, 62 Ill. Adm. Code 1762.11 (b), is in violation of the Federal Statute and the State Statute.

6. Designation of Lands Unsuitable for Surface Mining means that if general, minimum, capability standard for all surface mining (identified in Paragraph 1 preceding) together with Special Requirements for Prime Farmland (identified in Paragraph 3 preceding) cannot be met on certain prime lands then reclamation of those lands is not technologically feasible and thus those lands shall be Designated Unsuitable for Surface Mining. (Par. 5)

7. Petitioners understand the difference between land surface mined before 1976 and land surface mined and reclaimed after July 1, 1976.

   (a) Before 1976, surface mined land was subject to successive conditions.

      (1) "Pre-law" means "pre-Illinois law" i. e. prior to 1962 when little or no effort was made in Illinois to provide for post-mining land use.

      (2) After 1962, from time to time, increased leveling of spoils was required.

   (b) Finally, in 1976, put into actual practice in mining fields in 1976, Illinois law required "topsoil over chemically and texturally prescribed root medium."

   (c) This 1976 Illinois method of reclamation, through rulemaking, would become the standard for reclamation under the 1977 Federal Surface Mining Act regulations.

Statement of Issues continued

8. The 1976 Illinois standard of reclamation was incorporated into the Federal Surface Mining Act regulations, and is identified in this Petition as the "Highest Standard of Reclamation."

   (a) Terms which can be used interchangeably are:

      (1) "Darkened surface soil"

      (2) "Topsoil"

      (3) "Horizon A"

   (b) Several objective soil scientists should be asked to verify statements in (c) following:

   (c) "Highest Standard of Reclamation" is synonymous with any or all of the following:

      (1) Illinois State Law, 1975, 96½ Ill. Rev. Stat. 4507 (j) which reads: "Darkened surface soil shall be segregated and replaced" over "agricultural root medium."

      (2) Illinois State Rule initiated in actual practice in Illinois surface mining fields in 1976, requires "darkened surface soil" over material meeting "texture requirements" and being "chemically suitable" as an "agricultural root medium." (Rule 1104, Exhibit A, Document C)

      (3) The 1977 Federal Surface Mining Act and regulations written in 1979 which allows "suitable substitute" in lieu of specific horizons and which was incorporated into Illinois regulations. (Exhibit A, Document F;compare with Act, Document D)

      (4) Illinois Interim Program since 1978

      (5) Illinois Permanent Program since 1983 96½ Ill. Rev. Stat. 7903.07 (Exhibit A, Document E)

      (6) Current Illinois Regulations 62 Ill. Adm. Code 1823 (Exhibit A, Document F)

Statement of Issues continued

9. There is a purpose for establishing that the standard of reclamation initiated in surface mining fields in Illinois in 1976 is the standard which has been used ever since and is the standard to be used in the future.

   (a) The purpose for identifying this one standard of reclamation is to be able to target and study field results of this one standard.

   (b) Since this one standard, the "Highest Standard of Reclamation," is the standard to be used in the future we can then determine if the "Highest Standard" can restore Tama, Sable, Ipava soils.

10. In the late 1970's the idea of "restoration" of land after mining to the "capability" that existed before mining was so new a concept that there was no performance data for restoration, only theoretical supposition. (So-called "field studies" consisted of old spoils which had benefited from freezing and thawing for 25 years, and which had benefited from organic matter supplied by livestock, a situation not reflective of ordinary day-to-day industry mining procedure.)

    Therefore, without performance data, permits have been issued on the "promise" to perform.

    But now, thirteen years after the "Highest Standard of Reclamation" has been actually used year-after-year, we are able to study performance rather than rely on promise and therefore can decide if that performance is good enough to restore highly productive land to the capability that existed prior to mining.

11. It is about the "technical feasibility" of the "Highest Standard of Reclamation" as applicable to Tama, Sable, Ipava soils that is the subject of this Petition to Designate Tama, Sable, Ipava soils in certain locations as Unsuitable for Surface Mining. 62 Ill. Adm. Code 1762.11 (a)

Statement of Issues continued

12. The "Highest Standard of Reclamation" (Part D Paragraph 8) of mined Tama, Sable, and Ipava soils results in Reclaimed Soil Rapatee 872B.
(Exhibit A, and Part D Paragraph 8)

(a) Assessed valuation for taxes on Reclaimed Soil Rapatee 872B is one-half that of unmined Tama, Sable, Ipava soils.
(Part H Paragraph 4 (c), and Exhibit A, and Part E Par. 5)

(b) Appraised real estate value of Reclaimed Soil Rapatee 872B is one-half that of unmined Tama, Sable, Ipava soils.
(Part H Paragraph 4 (d), and Exhibit A)

(c) Government Programs are limited on reclaimed soil.
(Part H Paragraph 4 (e)

(d) Economic analysis of farming Tama, Sable, Ipava soils Before Mining and farming Reclaimed Soil Rapatee 872B After Mining shows a diminished return.
(Part H Paragraph 5 and Exhibit B)

13. Because Paragraph 12, preceding, indicates that mined Tama, Sable, Ipava soils reclaimed to "Highest Standard of Reclamation," (Part D Paragraph 8) is Reclaimed Soil Rapatee 872B, which is a reclaimed soil that does not have the "Capability" (Part D Paragraph 2) of unmined Tama, Sable, Ipava soils; therefore, it can be concluded that reclamation of Tama, Sable, Ipava soils is "not technologically feasible."
62 Ill. Adm. Code 1762.11 (a)

14. Thus, mining Tama, Sable, Ipava soils "adversely affects" a "renewable resource land" and results in a "substantial loss and reduction of long-range productivity."
62 Ill. Adm. Code 1762.11 (b) (3)

15. Hence, Tama, Sable, Ipava soils in locations identified in this Petition must be Designated Unsuitable for Surface Mining.
62 Ill. Adm. Code 1762.11

Part E: Petitioner Knox County Farm Bureau
Identification of Petitioner's Interest
Demonstration of How Petitioner Meets "injury in fact"
Description of injury to specific affected interest
Demonstration of How Petitioner is among injured
As required by 62 Ill. Adm. Code 1764.13

Right to Petition: Identification of Petitioner

1. As an Illinois "corporation" Knox County Farm Bureau is a "person" under 62 Ill. Adm. Code 1701.

2. Knox County Farm Bureau is a volunteer membership organization in Knox County.

3. Members of the Knox County Farm Bureau empower the Knox County Farm Bureau Board to act in their interest and in the interest of agriculture in Knox County.

4. Knox County Farm Bureau is a "person having an interest which may be adversely affected by surface mining" under 62 Ill. Adm. Code 1701.

Statement on "Standing" of Petitioner

1. For definition of "standing"Knox County Farm Bureau relies on two sources:

   (a) "Standing"as defined by: NATIONAL WILDLIFE FEDERATION V HODEL, 839 F. 2d 694 (D. C. Cir. 1988) which on pages 704 and 705 references the U. S. Supreme Court definition of "standing" as "three separate, yet necessarily intertwined components:"

      (1) "Some actual or threatened injury .. that has been or will in fact be perceptibly harmed by the challenged agency action. (Emphasis added.)

      (2) The injury alleged must be "fairly traceable" to the action under attack.

      (3) The injury "is likely to be redressed by a favorable decision."

(b) "Standing" as defined by: HOUSE OF REPRESENTATIVES REPORT No. 218, 95th Congress 1st Session (1977), concerning the Surface Mining Act. On page 90 it reads:

> *"It is the intent of the Committee that the phrase 'any person having an interest which is or may be adversely affected' shall be construed to be coterminous with the broadest standing requirement enunciated by the U. S. Supreme Court." (emphasis added.)*

2. Although the nature of a Petition to Designate Lands Unsuitable concerns future action, the emphasis on the definition of "standing" to include "will be" and "may be" in Paragraph 1 (a)(1) preceding is made for the reason that in "Administrative Hearing" and "Judicial Review" of Permit # 132 by CITIZENS FOR THE PRESERVATION OF KNOX COUNTY, the testimony of Leo Hennenfent, Knox County Board Member and Knox County Farm Bureau Member, was challenged on the basis that his concern was not solely with re-mining of already mined soils under Permit Application # 132 per se, but with future mining of unmined soil, and that to issue # 132 would lead to expansion of mining onto unmined soil.

   Note: Mr. Hennenfent's concern was realized with the filing of Permit Application # 227 for surface mining unmined Tama, Sable, Ipava soils.

3. Among "persons" who are Petitioners along with Knox County Farm Bureau for this Petition is an "individual" who is a Farm Bureau member.

   (a) Egbert Threw is a member of Illinois Farm Bureau.

   (b) Mr. Threw owns farmland property adjacent to current surface mining in Salem Township.

   (c) He is in the path of expansion of surface mining, "east and southeast of current mining" as quoted by a representative of Midland Coal on April 6, 1989, before the Land Use Committee of the Knox County Board.

   (d) The property of Mr. Threw is located on those Sections of land in Salem Township for which this Petition requests Designation of Lands Unsuitable for Mining.

<u>Right to Petition:</u> <u>Demonstration of How Knox County Farm Bureau Meets "Injury in fact" test of "person having an interest" Description of injury to "specific affected interest" Demonstration of how Knox County Farm Bureau members Are among the injured</u>

1. Knox County Farm Bureau is a non-profit organization of "farmers" who "use" the "economic resource of farmland." 62 Ill. Adm. Code 1701

2. "Farmers" are individuals or corporations who are:

   (a) Owner-operators of farmland, or

   (b) Owners of farmland, or

   (c) Operators of farmland.

      (1) "Operators" are identified as "tenants" or "renters" or "lessee."

3. <u>Knox County Farm Bureau is dedicated to improving the profitability of farming.</u>

   <u>Allegation</u>: Surface Mining Tama, Sable, Ipava soils adversely affects farmers by decreasing the profitability of farming.

   <u>Supporting Evidence</u>:

   Farmers want to make a profit from farming.

   Profitability of farming is dependent upon many factors, among them, <u>quality of soil</u> and <u>availability of farmland</u>.

   (a) <u>Injury in fact based upon "quality of soil</u>."

      (1) Farming on Tama, Sable, Ipava soils, Reclaimed to "Highest Standard of Reclamation" which is Reclaimed Soil Rapatee 872B results in decreased income for a farmer.
      Part H, Paragraph 4 (e)
      Part H, Paragraph 5 and Exhibit B

(b) Injury in fact based on "availability of farmland."

(1) The incentive to sell farmland for surface mining can be an offer by the coal company to an owner-operator to exchange farmland near the mine for farmland a distance from the mine.

Injury in fact. This exchange can mean that the renter of the farmland a distance from the mine is displaced in order to accommodate the new owner-operator.

(2) A coal company can either engage its own farm crew to operate a farm or it can lease the land before and after mining to a tenant.

Injury in fact. Some farmers who have leased coal company owned land for farming have felt constrained from expressing an opinion in public about surface mining for fear that their lease to farm coal company owned land might be withdrawn, thus, that farmer's freedom of expression has been restrained.

4. Knox County Farm Bureau is committed to conserve and to maintain the productivity of the soil.

Allegation: Continuing to mine Tama, Sable, Ipava soils will adversely affect renewable resource lands on which mining will result in a substantial loss and reduction of long-range productivity of food production.
62 Ill. Adm. Code 1762.11 (b) (3)

Knox County Farm Bureau concurs with the United States Department of Agriculture statements from PRIME FARMLAND IN ILLINOIS," map, 1977, which reads:

"Prime farmland has the soil qualities and moisture supply to produce sustained high yields of crops when adequately treated and managed." (emphasis added)

"Loss of land well suited to the production of food, forage and fiber is a matter of growing concern to the Nation. Major consideration must be given to prime farmland and the long-range need to retain the productive capability and environmental quality of American Agriculture. Developments that results in irreversible land use changes represent a loss of valuable natural resources." (emphasis added)

Supporting Evidence: Part H and Exhibit A and Exhibit B

5. Knox County Farm Bureau members are obligated to support Knox County through their real estate tax dollars.

Allegation: Mining Tama, Sable, and Ipava soils and reclaiming them to "Highest Standard of Reclamation" reduces the tax base of Knox County.

See definition of "Highest Standard of Reclamation" in "Statement of Issues," Part D.

Note: It is emphasized that this allegation refers to land mined to the same standard as would be used for mining in the future.

This allegation does not refer to "old spoil banks" which are identified as Lenzberg 871.

This allegation refers to Reclaimed Soil Rapatee 872B which is "Topsoil over agricultural root medium."

Supporting Evidence:

(a) Tama, Sable, Ipava soils, mined and reclaimed to "Highest Standard of Reclamation" is converted to Reclaimed Soil Rapatee 872B. (Exhibit A)

(b) Equalized Assessed Value per acre unmined Tama $ 307.5
" " " " Sable $ 329.6
" " " " Ipava $ 351.7
(Knox County Tax Assessment)

(c) Equalized Assessed Value per acre
Reclaimed Soil Rapatee $ 160.5
(Knox County Tax Assessment)

(d) Because tax revenue from mined Tama, Sable, and Ipava soils is less than unmined Tama, Sable and Ipava soils, a deficit in tax revenue is created.

Injury in fact. A deficit in tax base in Knox County will adversely affect all Knox County Farm Bureau members who will be obliged to either pay an increase on their own taxes to compensate for the deficit or else be deprived of community services.

(e) The rate of increase in deficit in tax revenue is directly related to increase in number of acres of farmland converted by surface mining to a lesser tax evaluation.

(f) Conversion of farmland to surface mining can take p] .3 at a rapid rate.

The following information is from Table V, Annual Reports of Illinois Department of Mines and Minerals.

"Acres Affected" means unmined acres affected in addition to unmined acres affected the previous year.

Year ending 6/30/77, mining, Knox County,	361 acres
6/30/78	346 acres
6/30/79	393 acres
6/30/80	250 acres
6/30/81	110 acres

(g) If this Petition is denied, the permanent tax revenue loss year-after-year can be calculated in a dollar figure.

Proposed Study uses the "Real Estate Farmland Assessment File Listing" at Knox County Court House. Each Tax Parcel includes "Soil" by universal number (Tama 36, Sable 68, Ipava 43A); "Productivity Index" (Note: P. I. for Tax Assessment is different from P. I. for Soil Productivity as ordinarily used and as shown in Circular 1156, U of Ill.) "Acreage" of each soil type; "Dollar per acre" assessed value; "Value" per total acres of certain soil type.

From this "File Listing" the pre-mining tax revenue on Tama, Sable, Ipava soils can be compared to projected post-mining tax revenue from Reclaimed Soil Rapatee 872B to show permanent year-after-year dollar loss to tax base resulting from mining lands identified in this Petition.

(h) Exhibit C is the July 19, 1989 "News Release" from Carl Sandburg College.

The college announces plans for a property tax increase through a referendum this fall.

In recent past, Knox County has had a tax referendum for grade and high schools, and for highways.

It is not rational for residents of Knox County and members of the Knox County Farm Bureau who are asked to increase the amount of taxes they pay, to allow, at the same time, the conversion of Tama, Sable, Ipava soils through the "Highest Standard of Reclamation" to become Reclaimed Soil Rapatee 872B and thereby to decrease the tax base.

Documentation for this Part E, Paragraph 5 includes:

1. Definition of "Highest Standard of Reclamation," in "Statement of Issues," this Petition.

2. Statutes and Regulations, Exhibit A, Documents C, D, E, F, G

3. Part H, this Petition.

4. Exhibit A.

5. Exhibit B.

6. Exhibit C.

7. Permit to Mine, Exhibit A, Document A.

   Note: Only recently are permits numbered prior to filing at the Court House; therefore, the number of this permit can be known only by extrapolation which in not within the authority of this researcher to assign.

   Note: Muscatine Soil is identified in this permit along with Tama, Sable, Ipava in the Permit for the reason that some older soil surveys of Knox County showed Muscatine Soil which has the highest Productivity Index in Illinois, P. I. 167, therefore the inclusion of Muscatine enhances rather than detracts. Instead of Muscatine, the modern soil survey shows Tama, Sable, Ipava.

8. Pre-mining modern soils map as part of permit should be available from IDMM; or from Anna Johnson (Source: USDA-SCS Note: SCS may have sent theirs to archives)

9. Post-mining map, "Soil Survey of Knox County, Illinois, 1986." Sheets 18, 19, 26. At USDA-SCS or Court House, Knox County.

10. IDMM Annual Reports, 1978, 1979, 1983, 1986, Table V "Acres affected." Available at Western Illinois University, 4th floor.

11. Illinois Department of Revenue, "Farmland Assessment Law."

12. "Knox County Real Estate Farmland Assessment File Listing," year 1989. Copley Township, pages 567-575
    Walnut Grove Township, pages 246-249
    At Knox County Court House

Comment concerning "Documentation for Part E, Par. 5" previous page:

1. This study references Knox County.

2. If for any reason this study is challenged, a similar study can be made for Tama, Sable, Ipava soils in Peoria County for permits in which land was reclaimed after July 1, 1976. (or any later date)

3. Permits should be available for study in Peoria County Court House. (A telephone call confirms that they are immediately available.)

4. Peoria County Soil Survey is now complete but not published. Pre-publication sheets are available from USDA-SCS.

5. A study of Peoria County is desirable because:

    (a) It will confirm Knox County results.

    (b) The "Elm Mine" reclamation in Peoria County:

        (1) Is cited in Permit Application #227 for Knox County as the standard for reclamation for #227.

        (2) Would likely be cited as the standard for reclamation for any new permit application for sections identified in this Petition for Declaration of Lands Unsuitable.

Note: Elm Mine is closed.

There is currently no surface mining in Peoria County.

Part F: Petitioner Egbert Threw
Identification of Petitioner's Interest
Demonstration of how Petitioner meets "injury in fact"
Description of injury to specific affected interest
Demonstration of how Petitioner is among injured
As required by 62 Ill. Adm. Code 1764.13

Right to Petition: Identification of Petitioner

1. As an "individual" Egbert is a "person" under 62 Ill. Adm. Code 1701

2. Egbert Threw is a "person having an interest which is or may be adversely affected" under 62 Ill. Adm. Code 1701

Right to Petition: Demonstration of how Egbert Threw meets "injury in fact" test of "person having an interest" Description of injury to "specific affected interest" Demonstration of how Egbert Threw is "among injured"

1. Egbert Threw owns property immediately southeast of Permit # 212.

2. Mr. Threw has been a farmer all his life who "uses" the "economic resource of farmland." 62 Ill. Adm. Code 1701

    (a) Mr. Threw has always tried to make his farming operation profitable.

3. An "interest" in addition to farming as a occupation, is that Mr. Threw has an "esthetic" appreciation of the lifestyle of farming. 62 Ill. Adm. Code 1701

    (a) Mr. Threw has always liked to farm. He enjoys farming.

4. Mr. Threw is a member of the Illinois Farm Bureau.

    (a) He concurs with Knox County Farm Bureau's allegation that it is "not technologically feasible" to restore Tama, Sable, Ipava soils to the capability that existed prior to mining.

    Supporting evidence is Part E and Part H.

5. Mr. Threw's farmland is in the path of proposed expansion of mining "east and southeast" of current mining as announced on April 6, 1989 by the coal company representative at the company's appearance before the Land Use Committee of the Knox County Board.

6. Should farmland surrounding his farm be converted to surface mining, Mr. Threw's farm property would be encircled.

7. Injury in fact: Threatened with encirclement, Mr. Threw would be pressured to choose between selling his farmland to the coal company or remaining on his property and be surrounded by surface mining and be subject to effects of surface mining.

   (a) The farmland owned by Mr. Threw is land homesteaded by his ancestors.

   He does not wish to sell his property.

   (b) Mr. Threw's "expertise" gained from his personal "experience" of farming near an area which has undergone coal mining in the past allows Mr. Threw to speak as an "expert" about the impacts of surface mining on adjacent landowners.

      (1) Mr. Threw alleges and his expert opinion based upon his experience is supporting evidence that mining operations "could result in a substantial loss or reduction of long-range productivity of water on renewable resource lands," hence a "specific injury" to his "interest" as a farmer.
      62 Ill. Adm. Code 1762.11 (b) (3) and 1701

8. The threat of land acquisition surrounding his property and of his property per se is an interference with Mr. Threw's "inherent and inalienable rights" under Article One of the Illinois Constitution, to the possession, use, and enjoyment of his property, thus constituting a "taking," and hence, creating for Mr. Threw, a cause of action.

Part G: Petitioner Sharon Terrell
Identification of Petitioner's Interest
Demonstration of How Petitioner Meets "injury in fact"
Description of injury to specific affected interest
Demonstration of How Petitioner is Among Injured
As Required by 62 Ill. Adm. Code 1764.13

Right to Petition: Identification of Petitioner

1. As an "individual" Sharon Terrell is a "person" under 62 Ill. Adm. Code 1701.

2. Sharon Terrell is a "person having an interest which is or may be adversely affected" under 62 Ill. Adm. Code 1701.

Right to Petition: Demonstration of how Sharon Terrell meets "injury in fact" test of "person having an interest Description of injury to "specific affected interes Demonstration of how Sharon Terrell is "among injur

1. Sharon Terrell is the owner of Historic land on which is situated an Historic dwelling which is eligible for listing on the State or National Register of Historic Places. 62 Ill. Adm. Code 1701; 62 Ill. Adm. Code 1762.11 (b) (2)

2. This Historic place is one mile east of the area of Permit Application # 227.

3. This Historic place is in the path of the expansion of surface mining and would be adversely affected by the expansion of surface mining onto the lands identified in this Petition.

4. The dwelling is constructed of stone.

   (a) Injury in fact is potential damage to the structure from blasting at a nearby surface mine.

5. The property owner is dependent upon the well on this property as a domestic water supply.

   (a) Injury in fact is potential interruption in water supply.

6. The Petitioner opens this Historic home to the public for House Tours.

   In certain circumstances a house on the National Register is <u>required</u> to be open to the public at certain times.

   (a) <u>Allegation.</u> Visitors to a House Tour who park their vehicles along the roadway are subject to the danger of swiftly passing coal truck traffic.

      (1) <u>Supporting Evidence</u>. In the past, Mrs. Terrell has requested that a coal trucking company that regularly uses County Highway 22 to please use an alternate route on the days of House Tours but her request has been unheeded.

      (2) In the future, coal truck traffic from the expansion of surface mining would necessarily increase and compound the problem of safety for the public to visit this Historic property.

7. The Petitioner has expended considerable financial investment and personal effort in restoring this Historic property.

8. Potential damage to his Historic property would be damage to a tribute to the "cultural" and "esthetic" values of Salem Township. 62 Ill. Adm. Code 1762.11 (b) (2)

9. Petitioner requests "Designation of Lands Unsuitable" for land identified in this Petition in the name of herself and also the public who experience esthetic enjoyment in their appreciation of this Historic property.

10. According to 36 CFR 800.1 a federally assisted undertaking is to be subject to the requirements of the National Historic Preservation Act.

   (a) The Illinois Department of Mines and Minerals, Land Reclamation Division, receives a "fifty percent federal match of state funding" for the purpose of paying their operating expense.
   (Most recent IDMM Annual Report, 1986, page three)

   (b) As a federally assisted agency, IDMM would be expected to be especially mindful of their responsibility in decision-making concerning Historic property.

Part H: Allegations and Supporting Evidence
As Required by 62 Ill. Adm. Code 1764.13 (b) (1) (E)
"That Tama, Sable, Ipava soils cannot be reclaimed
to meet the Criteria for Restoration of Soil
after surface mining."

1. Ranking in excellence of Tama, Sable, Ipava soils.

   (a) There are 425 soils of Illinois listed on Circular 1156. (University of Illinois, 1978)

   (b) Of these 425 soils, 31 soils are prime soils, Class A.

   (c) Of the 31 Class A prime soils, 13 have a Productivity Index between 155 and 167.

   (d) Within these 13 Prime A soils, Tama has P. I. 155, Ipava P. I. 163, Sable P. I. 156.

2. Allegation: Tama, Ipava, Sable soils are among the finest soils in Illinois.

   Supporting Evidence: Information contained in Part G 1. preceding.

3. Criteria for Restoration of prime farmland soil after surface mining:

   (a) Long-term agricultural post-mining land use.
   62 Ill. Adm. Code 1773.15 (c) (9)

   (b) Intensive agricultural post-mining land use.
   62 Ill. Adm. Code 1773.15 (c) (9)

   (c) Within a reasonable time.
   62 Ill. Adm. Code 1785.17 (e) (3)

   (d) Return to equivalent or higher levels of yield (production) as non-mined prime farmland in the surrounding area
   62 Ill. Adm. Code 1785.17 (e) (3)

   (e) Under equivalent levels of management
   62 Ill. Adm. Code 1785.17 (e) (3)

4. Allegation: No reclamation of Tama, Sable, Ipava soils has met the Criteria of "Long-term," "Intensive," "Within a reasonable time," "Return to equivalent yield (productivity), "under equivalent levels of management."

Supporting Evidence: What we know about reclamation of Tama, Sable, Ipava soils can be derived from Reclamation Research, the Agricultural Lands Productivity Formula, Tax Assessment Valuation, Real Estate Appraisal, and United States Department of Agriculture Programs.

(a) Reclamation Research conducted by Dr. Ivan Jansen and associates at the University of Illinois has resulted in 25 published articles. (Available from U/I)

(1) Research generally is conducted on plots, not production-agriculture size entire fields.

(2) Research plots are in many instances specially constructed rather than being an on-site industry-constructed area of day-after-day commercial reclamation.

(3) In RECONSTRUCTING SOIL AFTER SURFACE MINING OF PRIME AGRICULTURAL LAND published March 1981 in MINING ENGINEERING, Dr. Jansen states:

"Long term average corn yield expectations under high management on Illinois prime farmland soils range from about 167 bushels per acre on the best soils to less than 96 bushels per acre on less desirable soils."

"Mines operating on some of the best soils have a very high objective to achieve in trying to construct postmine soils that equal or exceed surrounding unmined soils in production. Since the undisturbed soils have nearly ideal properties, one does not have the opportunity to try correcting soil problems during the mining and reclamation process." (emphasis added)

(4) Review of Dr. Jansen and associates reclamation research reveals that no place in the 25 articles does Dr. Jansen make the statement that the restoration Criteria of Part H Paragraph 3 can be met on Tama, Sable, Ipava soils.

(b) <u>Agricultural Lands Productivity Formula</u>

(1) ALPF was created by Dr. John Lohse and associates at the Illinois Department of Agriculture.

(2) Harvest method can be "Hand Harvest," rather than production-agriculture machine harvest.

(3) Yield is determined from "Sample" not full-field.

(4) Purpose of creating ALPF was to establish a means to determine Revegetation Bond Release.

(5) Even if ALPF establishes right to release bonds, that action can not be considered evidence of satisfying Criteria of Part H Paragraph 3.

Criteria for Restoration of Return to Capability and Goals for Revegetation Bond Release are two separate concepts.

This statement is made in a spirit of generous concern that lands <u>already permitted</u> will eventually have to either meet goals for bond release or forfeit bond; but this "generous concern" does <u>not</u> extend to lands not yet under permit.

Bond release for old existing permits issued on "promise" to perform should not be a basis for issuing new permits because in the interval <u>new data</u> on actual performance becomes known which must be considered and which could indicate that a new permit application should <u>not</u> be approved.

(6) A <u>casual</u> observation of yields as tabulated in ALPF results indicates a distribution of "pass," "fail," and "withdrawn from testing" categories.

Reclamation results as tabulated by ALPF must be analyzed both <u>in depth</u> and in <u>consideration</u> to already-issued permits and <u>in depth</u> and in <u>fairness</u> to permits <u>not yet</u> approved. (year-by-year yield data is available at Knox County Court House beginning with year 1985, from IDMM, and from IDOA)

(7) ALPF is 62 Ill. Adm. Code 1816, Appendix

(c) <u>Tax Assessment Valuation</u>

The farmland assessment system, initiated by the Illinois General Assembly legislation is implemented by Illinois Department of Revenue.

<u>Allegation.</u> Tama, Sable, Ipava soils surface mined and reclaimed to "Highest Standard of Reclamation" (Part D) are returned to Reclaimed Soil Rapatee 872B which results in one-half the tax assessment valuation of unmined Tama, Sable, Ipava soils.

<u>Supporting Evidence.</u> Testimony by Anna Sophia Johnson presented June 8, 1989, Hearing, Permit Application # 227. (Exhibit A)

(d) <u>Real Estate Appraisal Valuation</u>

<u>Allegation</u>. Tama, Sable, Ipava soils surface mined and reclaimed to "Highest Standard of Reclamation"(Part D) are returned to Reclaimed Soil Rapatee 872B which results in one-half the real estate appraisal value of unmined Tama, Sable, Ipava soils.

<u>Supporting Evidence</u>. Testimony by Anna Sophia Johnson presented June 8, 1989, Hearing, Permit Application # 227. (Exhibit A)

(e) <u>United States Department of Agriculture Programs</u>

The Surface Mining Act, 30 USC 1201 (c) reads:

> *"The Congress finds and declares that ... many surface mining operations ... adversely affect commerce and the public welfare ... by counter-acting government programs and efforts to conserve soil, water, and other natural resources ..."*

<u>Allegation</u>. Tama, Sable, Ipava soils, mined and reclaimed to "Highest Standard of Reclamation" (Part D) become Reclaimed Soil Rapatee 872 B.

Farmers' benefits from USDA Programs on Reclaimed Soil Rapatee 872B are less than benefits on unmined Tama, Sable, Ipava soils.

Supporting Evidence. USDA Programs affected by surface mining are:

(1) "Agricultural Conservation Program"
Erosion control, cost share

(2) "Commodity Credit Corporation"
Funding Source

(3) USDA crop insurance does not cover crops grown on mined and reclaimed land.

Proposed Study would contain public information available from USDA-Agriculture Stabilization and Conservation Service for each farming operation on lands identified in this Petition.

(1) Data would show acres of Tama, Sable, Ipava soils planted prior to mining together with yearly monetary value of crops harvested from lands.

(2) Projection could be made of yearly monetary value of crops grown on those lands after mining and reclamation to "Highest Standard of Reclamation" (Part D) Reclaimed Soil Rapatee 872B.

(3) The difference between (1) and (2), above, is the dollar loss of agricultural production for one year.

(4) The year-after-year cummulative dollar loss of agricultural production can be calculated ad infinitum.

(5) Should this Petition be denied the dollar los of agricultural products will be a loss shared by local farmers, the County, and the Nation.

5. <u>Allegation.</u> The difference between Economic Value of Farm Operation Before Mining and Economic Value of Farm Operation After Mining of Tama, Sable, Ipava soils reclaimed under the "Highest Standard of Reclamation" (Part D) to Reclaimed Soil Rapatee 872B is diminished income.

<u>Supporting Evidence.</u> Testimony presented by Charles McKie, Appraiser, before Surface Mining Advisory Committee of Illinois Department of Mines and Minerals on June 28, 1989. (Exhibit B)

(1) This study uses the actual information contained in Permit Application # 227 for the proposed mining and reclamation of 160 acres of Tama, Sable, Ipava soils, and therefore, this study reflects the fact that the proposed reclamation plan places a final cut lake on prime land.

(2) To reclaim prime land soil to water is, however, no longer legal and is a violation of the October 18, 1988 Code of Federal Regulations Final Rule 785.17 (e) (5) which responds to the court decision in NATIONAL WILDLIFE FEDERATION V HODEL, 839 F. 2d 694 (D. C. Cir 1988

(3) Using the information contained in this study, it is possible to construct a study based on 160 acres of Tama, Sable, Ipava soils returned to 160 acres of Reclaimed Soil Rapatee 872B and the results would still be a diminished income after mining.

Part I (eye): Considerations Concerning Petition to Designate Tama, Sable, Ipava Soils On certain identified lands as Unsuitable for Surface Mining.

1. Petitioners point out incongruity between:

    (a) Stringent requirements IDMM establishes for Petitioner's "Right to Petition" for Designation of Lands Unsuitable

        (1) Describe specific affected interest

        (2) Demonstrate "injury in fact" and how injured

        (3) Allegations of fact to be specific and to be supported by evidence.

    (b) As contrasted with requirements IDMM uses for itself for IDMM approval of permits to mine.

        (1) IDMM affirms "technological capability" of applicant to restore prime farmland on basis of "belief" after "review of material" and "expertise of IDMM staff." (See "Written Findings" Permit # 132)

2. Mining on Tama, Sable, Ipava soils has been allowed on the basis of "hope" and "opinion" and "promise" <u>not</u> on the basis of "evidence" and "performance."

    (a) Thirteen years have passed since the "Highest Standard of Reclamation" (Part D) was put into effect in Illinois surface mining fields in 1976. (Part D Paragraph 12 and Exhibit A)

    (b) During these thirteen years the public has been solicitous of the coal industry in allowing mining to continue on Tama, Sable, Ipava soils on the basis of "hope" and "opinion" and "promise" that those soils would be restored.

    (c) Now, after thirteen years, the time has come that "evidence" and "performance" can be the measure of "technological capability" to restore, and therefore, Tama, Sable, Ipava soils, identified in certain locations, should be Designated Unsuitable for Mining. (Part H)

3. Tama, Sable, Ipava soils exist in Illinois <u>only</u> in Central Illinois and in West Central Illinois.

   (a) Surface mining on Tama, Sable, Ipava soils takes place <u>only</u> in West Central Illinois.

   (b) Of the 18,000 acres under surface mining permits in West Central Illinois, only 1,000 of these acres comprise Tama, Sable, Ipava soils.
   (June 9, 1989 communication by letter from IDMM to Anna Sophia Johnson)

   (c) Consequently, this Petition to Designate Tama, Sable, Ipava soils Unsuitable for Surface Mining is site-specific and <u>not</u> a precedent for designating all soils elsewhere in all the State of Illinois as unsuitable.

4. When it is determined beyond reasonable doubt that Tama, Sable, Ipava soils can be restored to meet Capability of Part D Paragraph 2, then a "Petition to <u>Terminate</u> Designation of Tama, Sable, Ipava soils as Unsuitable" can be proposed.
   62 Ill. Adm. Code 1764.13 (c)

5. In 1977, when Congress was considering the provisions of the Surface Mining Act, the idea of restoring land after mining to the capability that existed before mining was so new that there were only theoretical assumptions about the ability of the mining industry to restore prime land.

   Therefore, it was proposed that there be a five-year moratorium on mining prime land in order to conduct research on restoration.

   Instead of a moratorium, a <u>gamble</u> was undertaken and mining proceeded upon the finest prime land in the Nation.

   Part H shows that the gamble of mining on Tama, Sable, Ipava soils was <u>lost</u>.

   Upon whom should the burden of the risk of that gamble be placed?

   What is the <u>recourse</u> a County and its residents have in order replace the loss to their long-term renewable resource?

Part J: SUMMARY

Petitioners Sharon Terrell and Egbert Threw are landowners living on and owning land in the area identified in this Petition. Petitioners, the Knox County Farm Bureau, a farmer-member organization affiliated with the Illinois Agricultural Association, 170 Towanda Ave., Bloomington, IL., is an Illinois corporation conducting business in Knox County with its principal county office in Galesburg, IL.

Sharon Terrell is owner of the historic R.J. McKeighan farm home and Blacksmith Shop built in 1849, along Knox County Highway 22, Section 22. The property is eligible and pending for inclusion upon the National Register of Historic Places, United States Department of the Interior. When the Illinois Register of Historic Places opens again for nominations, undoubtedly the McKeighan farmstead and smithy will qualify for eligibility on its listing.

The McKeighan farm home and shop are described in the 1870 Knox County Atlas. The buildings exhibit excellent historical integrity and the farmstead layout is typical of early 19th century farms in this area. An historic function of the blacksmith shop was the invention by Robert John McKeighan of the gang and sulky plow and the single sulky plow in 1871.

The restoration of the farm home and shop accomplished with considerable expense to the owner is accurate in keeping with the historical period. The farmstead is framed pictorially by native trees and a deep Mississippian well has been drilled to supply domestic water to the site. From time to time the home and smithy are open to the public for educational tours and charity events.

The owner of this historic property located on land identified in this Petition alleges that surface mining operations and the resultant heavy coal hauling traffic past her place will substantially endanger her and her family, denying them their rights to a safe and healthful environment under Article XI of the Constitution of Illinois.

Sharon Terrell also alleges a loss to the quality and quantity of her domestic water supply if surface mining operations are permitted. Additionally, with a loss in property values, Sharon Terrell has a substantial personal and financial interest in seeking an unsuitability designation for this historic place and for the land adjacent to it.

Egbert Threw is owner and manager of farm properties in Sections 22 & 34, Township 9 North, Range 4 East in Knox County, that are included in the land parcels identified by soil types in this Petition.

A farmer, Mr. Threw has lived most of his life near the land proposed for surface mining operations in the Midland Coal Co. Permit Application #227. Midland Coal Co. has publicly announced on April 6, 1989, at Galesburg, IL., that if permitted to commence surface mining operations in Sections 20, 21, 28 & 29 of Salem Township as requested in Permit Application #227, the company plans to expand operations in an easterly and southeasterly direction onto land containing the prime agricultural soils and waterways identified in this Petition.

Mr. Threw has determined that such anticipated mining operations will result in a substantial loss or reduction of the long-range productivity of the aquifers and recharge areas that supply his farm properties.

An area may be designated as unsuitable for surface coal mining operations if these operations could result in a substantial loss or reduction of long-range productivity of water supply on renewable resource lands.

30 USC 1272 (a)(3)(C)
30 CFR 762.11 (b)(3)
Chpt. 96½ Ill. Rev. Stat. 7907.02(b)(3)

Renewable resource lands include . . . . aquifers and areas for the recharge of aquifers and other underground waters . . .

30 CFR 701.5

Mr. Threw alleges that in addition to the loss of the hydrologic balance, the base real estate value of his land would be reduced by surface mining operations, therefore he has a substantial interest in seeking an unsuitable designation for the renewable resource lands identified in this Petition.

Mr. Threw alleges that surface mining operations on the land identified in this Petition would be incompatible with existing land use plans, among them :

Knox County Soil Erosion and Sediment Control Plan,
P. L. 99-1998, PA 132, Food Security Act of 1985,
Sec. 540 (e) (4) (11)
Sec. 540.24 (d)
Illinois Water Quality Management Plan,
35 Ill. Adm. Code Part 351
Illinois State Groundwater Protection Act of 1987
Ch 111½ Ill. Rev. Stat. 1001-1052

The Knox County Farm Bureau and its parent organization, the IAA have historically and actively opposed surface coal mining Illinois farmland. The organization promotes the conservation and preservation of farmland for agricultural purposes by advocating responsible stewardship using best management practices. The Knox County Farm Bureau pursues its promotional goals by publishing and dispensing educational materials that focus on successful farming methods; by hosting seminars and workshops to that effect and by cooperating with other organizations and persons dedicated to the same goals.

Because the intent of Congress was to include in federal law protection for agricultural lands from the adverse effects of surface mining, the Knox County Farm Bureau joins member Egbert Threw in petitioning for an unsuitability designation for the lands containing Tama, Ipava, and Sable soils identified in this Petition. The Petitioners contend that the highest and best use of these soils is in the management of continuous, uninterrupted agriculture.

As Petitioners, the Farm Bureau alleges that surface mining operators cannot show the capability to restore the physical and chemical characteristics of the soils and overburden in and on the prime farmland identified in this Petition as required by the Act. Although evidence has shown modern reclamation techniques to be somewhat effective in restoring row crop production, there still is not enough evidence to assure that productivity on reclaimed areas on these Tama, Sable, Ipava soils in this specific place can consistently be restored to 100% or better following reclamation.

The Knox County Farm Bureau alleges a real injury to members owning land in Salem Township who are cooperators in the United States Department of Agriculture Agricultural Stabilization and Conservation Service farm production programs if surface mining operations begin on land identified in this Petition.

The Knox County Farm Bureau believes that erosion of the county tax base due to the loss of productivity on surface mined land affects all its members. More and more land is devaluated as surface mining operations continue in Knox County, Illinois. The General Assembly in 1980 declared a state policy of providing for the conservation and reclamation of mined lands by several methods; one being the provision to aid in maintaining or improving the tax base of a county.

Ch 96½ Ill. Rev. Stat. 7901.02

The Knox County Farm Bureau believes in maintenance of a strong tax base by achieving the highest agricultural productivity standards over the longest period of time; and that agricultural land kept in production so protected can support an agricultural economy long after that of land rendered less productive from the effects of surface mining.

The impacts of planned coal hauling traffic would overwhelm usage of Knox County Highway #22 causing a breakdown and deterioration of the road serving farmers in the affected area identified in this Petition.

The Knox County Farm Bureau alleges an injury in fact to the long-term interests and general welfare of society if the lands identified in this Petition are taken out of farmland production.

THE AFFECTED AREA COULD NOT BE RECLAIMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ACT AFTER SURFACE COAL MINING OPERATIONS

An area must be designated as unsuitable for surface coal mining operations if reclamation in accordance with the requirements of the ACT "is not technologically and economically feasible."

30 USC 1272 (a) (2)
Ch 96½ Ill. Rev. Stat. 7907.02

The reclamation requirements of the ACT and its regulations include a systematic and comprehensive regulatory scheme designed to protect the hydrologic balance and water quality and quantity in surface and groundwater systems in both the affected and adjacent areas. These requirements include restoration of the "recharge capacity of the mined area to approximate premining conditions."

30 USC 1265 (b) (10) (d)
Ch 96½ Ill. Rev. Stat. 7903.10 (f)

and preservation "throughout the mining and reclamation process of the essential hydrologic functions of the natural systems."

30 USC 1272 (a) (3) (B)
Ch 96½ Ill. Rev. Stat. 7907.02 (b) (2)

The ACT and its regulations also require that all disturbed prime farmland be restored to a condition capable of supporting the uses which it was capable of supporting prior to surface mining operations.

30 USC 1269 (c) (2)
Ch 96½ Ill. Rev. Stat. 7906.08 (d) (2)

The state-of-the-art mining reclamation methods as practiced on prime farmland soils by mining operators in Knox County, Illinois, lead Petitioners to allege it results in low water infiltration, inadequate penetration, poor gas exchange and accelerated erosion. These factors significantly impede or prevent the return to full crop productivity and intensive agricultural use the ACT demands. The best reclamation that the state-of-the-art can create after surface mining the Tama-Ipava-Sable soils is to the Reclaimed Soil Rapatee 872B which results in a diminished Productivity Index.

Petitioner Egbert Threw alleges that surface coal mining the prime farmland soils specific to the area identified in this Petition would irreparably harm the hydrologic balance and diminish water quality and quantity of the affected and adjacent areas.

The hydrologic balance of the affected and adjacent areas involves, among other processes, the critical and complex relationship between surface water and groundwater.

Surface coal mining operations would irreparably damage the hydrologic balance of the area by destroying the major and other localized aquifers and by permanently altering aquifer recharge capacity, storage and transmissivity.

Disturbing land that drains into the major aquifer and stream corridors will permanently alter natural drainage patterns essential for maintenance of this productive highest quality farmland.

Petitioners allege that surface mining operators do not have the ability to restore the physical and chemical characteristics of the prime farmland soils identified in this Petition.

Petitioners allege that the Tama, Ipava, and Sable soils identified in this Petition reclaimed to the Highest Standard would not be restored to the capability existing prior to mining.

Petitioners allege that these soils, Tama, Sable, and Ipava, reclaimed to the Highest Standard, Rapatee 872B, do not maintain the Knox County Property Tax Base at pre-mining level.

Petitioners allege that burning high sulfur coal mined from the lands identified in this Petition would adversely affect the health and human environment of people.

42 USC 7412 et. seq.

CONCLUSION

Petitioners allege they are persons having an interest which may be adversely affected.

WHEREFORE, the Petitioners request that the lands identified in this Petition by soil associations be designated as unsuitable for surface mining operations.

Sharon Terrell by John Terrell
Sharon Terrell

Egbert Threw
Egbert Threw

Joe Murdock
Joe Murdock, President
Knox County Farm Bureau

SUBSCRIBED AND SWORN TO before me
this 31 day of July 1989.

Martha B. Lumberry
Notary Public

"SEAL"
LUMBERRY
State of Illinois
...on Expires 3-6-9

"OFFICIAL SEAL"
MARTHA B. LUMBERRY
Notary Public, State of Illinois
My Commission Expires 3-6-9

Part J: LETTER, August 16, 1989
from Illinois Department of Mines and Minerals
to Knox County Farm Bureau
Determining that Petition is "INCOMPLETE" and
Citing Requirements to Make Petition Complete

see overleaf

ILLINOIS DEPARTMENT OF MINES AND MINERALS

Richard R. Shockley
Director

300 WEST JEFFERSON STREET - SUITE 3
P.O. BOX 10137
SPRINGFIELD, ILLINOIS 62791-0137
TELEPHONE: (217) 782-6791

August 16, 1989

Mr. Dennis Hartung, Manager
Knox County Farm Bureau
180 South Soangetaha Road
Galesburg, Illinois 61401

Dear Mr. Hartung:

Re: Lands Unsuitable for Mining Petition No. LU-003
Salem Township, Knox County, Illinois

On August 2, 1989, the Illinois Department of Mines and Minerals (Department) received a Lands Unsuitable for Mining Petition submitted by Sharon Terrell, Egbert Threw and the Knox County Farm Bureau concerning the Salem Township of Knox County, Illinois (Petition). Pursuant to 62 Ill. Adm. Code 1764.15(a)(3), the Department has concluded its initial processing of the Petition and has determined that such Petition is incomplete. The Department's reasons for this determination, and the categories of information needed to make the Petition complete, are discussed below.

As provided by 62 Ill. Adm. Code 1764.13(b)(1), a complete petition to have an area designated as unsuitable for surface coal mining operations must contain, at a minimum, the following information:

A) The petitioner's name, address, telephone number, and notarized signature;

B) Identification of the petitioned area, including its location and size, and a U.S. Geological Survey topographic map outlining the perimeter of the petitioned area,

C) An identification of the petitioner's interest which is or may be adversely affected by surface coal mining operations, including a statement demonstrating how the petitioner satisfies the requirements of subsection (a);

D) A description of how mining of the area has affected or may adversely affect people, land, air, water or other resources, including the petitioner's interests; and

E) Allegations of fact and supporting evidence, covering all lands in the petition area, which tend to establish that the area is unsuitable for all or certain types of surface coal mining operations, pursuant to specific criteria of Sections 7.02(a) and (b) of the Surface Coal Mining Land Conservation and Reclamation Act (Ill. Rev. Stat. 1985, ch. 96 1/2, pars. 7907.02(a) and (b)) (State Act), assuming that contemporary mining practices required under applicable regulatory programs would be followed if the area were to be mined. Each of the allegations of fact should be specific as to the mining operation, if known, and the portion(s) of the petitioned area and petitioner's interests to which the allegation applies and be supported by evidence that tends to establish the validity of the allegations for the mining operation or portion of the petitioned areas.

The Department has determined that the Petition satisfies the completeness requirements set forth in subsections (A) through (D) of Section 1764.13(b)(1) of the Department's rules. However, the Department has also determined that this Petition contains allegations of fact relating to lands in the petitioned area that are not supported by evidence that tends to establish the validity of the allegations for the petitioned areas, as required by subsection (E) of Section 1764.13(b)(1).

Specifically, at page 3 of the Petition, the petitioners allege "...that irreparable damages of loss of soil productivity, water quality and quantity, and loss to the county tax base and damage to an historical site will be caused by surface mining operations in the area identified in this Petition." The petitioner's allegations regarding loss of soil productivity, the loss to the county tax base and damage to a historical site are linked to supporting evidence set forth within the body of the Petition, as required by Section 1764.13(b)(1)(E). However, the allegations regarding losses to water quality and quantity are not supported by evidence that tends to establish the validity of these allegations for the petitioned area. Thus, the Petition is incomplete and must be returned, pursuant to 62 Ill. Adm. Code 1764.13(b)(1) and 1764.15(a)(3).

The allegations in the Petition regarding the potential loss of water quality and quantity due to surface coal mining operations, and the Department's analysis of each of these allegations, are set forth in detail below:

Numerical paragraph 2 on page 3 of the Petition states: "[a]vailable data strongly suggests that ...C) Surface mining operations would adversely affect the quality and quantity of the Petitioners water flows causing damages to essential hydrologic functions; D) Surface mining operations would result in a substantial loss or reduction in water flows recharging the area and a 20 mile radius...." No evidence is submitted in support of these claims.

Numerical paragraph 3 on page 4 of the Petition states: "(C) Operations could result in loss and/or reduction of long-range

productivity of water supplies including damage to aquifers and aquifer recharge areas of land now supporting agricultural activity." No evidence is submitted in support of these claims.

Numerical paragraph 7 on page 23 of the Petition states: "Mr. Threw alleges and his expert opinion based upon his experience is supporting evidence that mining operations could result in a substantial loss or reduction of long-range productivity of water on renewable resource lands,'...." (Emphasis in the original). The supporting evidence for this allegation is Petitioner Threw's "...expert opinion based upon his experience." Given the lack of any foundation submitted within the Petition for Petitioner Threw's "expert opinion", the Department cannot conclude that the Petitioners have submitted any evidence in support of these claims.

Numerical paragraph 5 on page 24 of the Petition states that Petitioner Terrell "...is dependent upon the well on [her] property as a domestic water supply." Petitioner Terrell then alleges that this well may be affected ("potential interruption in water supply") by mining. In the Summary, on page 35 of the Petition, Petitioner Terrell "alleges a loss to the quality and quantity of her domestic water supply if surface mining operations are permitted." No evidence is submitted in support of these claims.

In the Summary, on page 35 of the Petition, it is stated: "Mr. Threw has determined that such anticipated mining operations will result in a substantial loss or reduction of the long-range productivity of the aquifers and recharge areas that supply his farm properties." No evidence is submitted in support of these claims.

In the Summary, on page 39 of the Petition, it is stated: "Petitioner Egbert Threw alleges that surface coal mining the prime farmland soils specific to the area identified in this Petition would irreparably harm the hydrologic balance and diminish water quality and quantity of the affected and adjacent areas." No evidence is submitted in support of these claims.

In summary, the Department has determined that the factual allegations in the Petition relating to the losses of water quality and quantity that would result from surface coal mining operations within the petitioned area are not supported by any evidence that tends to establish the validity of these allegations, as required by 62 Ill. Adm. Code 1764.13(b)(1)(E).

The Petition is hereby returned to you, in accordance with 62 Ill. Adm. Code 1764.15(a)(3). Given the Department's determination that the enclosed Petition is incomplete, no further action will be taken in relation to this document until either:

1. The enclosed Petition is resubmitted with supporting evidence that tends to establish the validity of the factual allegations relating to the losses of water quality and quantity that would result from surface coal mining operations within the petitioned area; or

2. The enclosed Petition is resubmitted with a statement indicating the Petitioner's agreement that the factual allegations relating to losses of water quality and quantity that would result from surface coal mining operations is deleted from Petition No. LU-003.

Sincerely,

Paul J. Ehret

Paul J. Ehret
Supervisor
Land Reclamation Division

PJE:JCH:js
cc: R.Harnishfeger
J.Henrikson
K.Jacobs
J.Lynch
B.Phillips
S.Schmitz
R.Shockley
D.Spindler
M.Sponsler
S.Terrell
E.Threw
Midland Coal Company
OSMRE

Part L: Affidavit of Petitioner Sharon Terrell Submitting Supporting Evidence for her Allegations

Allegation page 24 of the Petition:

"Petitioner Terrell is dependent upon the well on her property as a domestic water supply."

Allegation page 24 of the Petition:

"This well may be affected from mining by potential interruption in water supply."

Allegation page 35 of the Petition:

"There will be a loss to the quality and quantity of her domestic water supply if surface mining operations are permitted."

Supporting Evidence

AFFIDAVIT OF SHARON TERRELL

My name is Sharon Terrell. I live at "Willow Row Stock and Grain Farm," Rural Route One, Farmington, IL.

In response to the Illinois Department of Mines and Minerals letter to Dennis Hartung of the Knox County Farm Bureau, written August 16, 1989, I submit this affidavit to satisfy the Department's statement that "No evidence is submitted in support of" the claims made by me on pages 24 and 35 of the Petition.

(Affidavit of Sharon Terrell continued)

From "Environmental Geology Notes # 90, January 1981, "Hydrogeologic Aspects of Coal Mining in Illinois: an Overview," by Keros Cartwright and Cathy S. Hunt, published by the Illinois State Geological Survey Division; on page six, I quote the following:

> *"Water quality generally deteriorates very rapidly with depth in the Illinois Basin, and fresh water is usually found at depths of 100 meters or less."*

The well on my property, identified in the Petition, was drilled in 1982 to a depth of 55 feet.

If I should lose the recharge area of my well at the present source, it would be necessary to drill a new well in a new location. In consulting with a well-drilling contractor I have learned that it is not practical to drill a deeper well on the same location because that would mean using a smaller casing inside the existing casing which is not desirable. Therefore, for technical reasons a new location for a new well would be necessary.

Relocating my well would cause me economic hardship and uncertainty.

I quote again from "Environmental Geology Notes # 90, previously identified, from page seven:

> *" ... the configuration of the local water table is altered during mining; the mine pit becomes the new local discharge point and ground water flows toward the mine."*

(Affidavit of Sharon Terrell continued)

In a length of time, it is possible that after mining the land adjacent to my property that my water source might recover but the authors of "Environmental Geology Notes # 90" state that if the surface level of water in the aquifer that serves my farm is pumped, then the drawdown in my well will decrease the yield of the well. The authors on page eight write:

> *"For practical purposes this well would then be nearly useless."*

In addition to the economic hardship of drilling a new well, the stress of bargaining with a surface mine operator over water replacement on my property causes me great alarm. The replacement of a water source would be an unknown factor to me.

How can I be certain that Midland Coal will be liable for replacing my water supply for as long into the future as it will be necessary to supply the needs of myself and my family?

I have doubts about the water quality in drilling for water on my property any deeper than the present 55 feet.

Fulton County, which adjoins Knox County, is experiencing problems of dissolved minerals and salt brought up from its deep wells. Wells drilled into the lower strata in this area also yield mineralized water of poor quality.

A surface mine operation adjacent to my property will, in all likelihood, drain the shallow aquifer that I now use as a source for domestic water. The same thing would happen to the shallow farm wells in this area as would happen to my domestic well on this old McKeighan Place.

(Affidavit of Sharon Terrell continued)

If I want to build a swimming pool, as it is my right to do, the mining operator mining adjacent to my land has no right to deprive me of my water source.

If I want to open up my home to the public as a Bed and Breakfast Inn, I must be guaranteed an unlimited supply of quality well water such as I now have, and in quantity, for an undetermined length of time.

Signed Sharon Terrell
Sharon Terrell

SUBSCRIBED AND SWORN TO before me

this 30 DAY OF August 1989.

"OFFICIAL SEAL"
[illegible]
[illegible]
[illegible]

Part M: Affidavit of Petitioner Egbert Threw (1) Identifying his qualifications as an "expert" based upon his "experience," and (2) Submitting Supporting Evidence for his Allegations.

Allegation page 23 of the Petition:

"Mr. Egbert Threw alleges and his expert opinion based upon his experience is supporting evidence that mining operations could result in a substantial loss or reduction of long-range productivity of water on renewal resource lands."

Allegation page 35 of the Petition:

"Mr. Egbert Threw has determined that such anticipated mining operations will result in a substantial loss or reduction of the long-range productivity of the aquifers and recharge areas that supply his farm properties."

Allegation page 39 of the Petition:

"Petitioner Egbert Threw alleges that surface coal mining the prime soils specific to the area identified in this Petition would irreparably harm the hydrologic balance and diminish water quality and quantity of the affected and adjacent area."

(1) Statement of qualifications
(2) Supporting Evidence

AFFIDAVIT OF EGBERT THREW

My name is Egbert Threw. Since retiring from farming I live at 104 Gold Street in Farmington, Illinois.

I think that I qualify as an expert witness to speak out about the effect strip mining has on the quality and quantity of farmland groundwater systems because I have lived and farmed all my life on land owned by my family for four generations.

(Affidavit of Egbert Threw continued)

I have seen and endured the workings of three coal companies on land once owned by my family in Salem Township and on land located near my family properties.

As a farmer, I am a person with a background in growing crops and managing the land which my family and I own and rent. My experience consists of on-the-spot observation throughout all of my years. I also maintain a good bookkeeping record for the family business.

From being a farmer who has lived and worked in a township extensively strip mined, I know that when a highwall is cut by a surface mining operation, the groundwater in the aquifer flows toward the mine pit and that the groundwater in the upper part of the aquifer drains down into the lower part of the aquifer. Water always seeks its own level. The remaining water source in the aquifer is short-lived. As water is pumped from a well adjacent to mining operations, the aquifer is drained. I have seen this happen. In fact, it happened on one of our family farms.

My father drilled a good well on the home place in Section 22, in Salem Township, in Knox County. One of the local coal mining companies moved in and strip mined the land adjacent to the well and that well and three others were drained dry.

The coal company told my father that they would construct a pond to try to recharge his well. By this statement the company admitted that it had caused the wells to go dry.

My father contracted for the pond and he finally had to pay for it himself; but the pond did not recharge the well.

(Affidavit of Egbert Threw continued)

In the course of my farming operations I have traveled all the roads past the mining and I have noted that the problems with land reclamation have all been water related.

Because I am a farmer, I know about the interaction between the soil and water in relation to growing crops. The way soil drains affects how a crop grows. The soil must not drain too much or too little. With the unmined prime farmland soils in Salem Township, the drainage factor usually maintains the water table level at a sufficient depth to allow bountiful crops to be grown.

I have employed field tile contractors to tile some of my farm fields. The purpose of laying field tile is to drain water from the land by conveying the water to an outlet at a lower level. Because I know the system of tile drainage, I know when and how a surface mining operation drains the near and adjacent fields.

I have applied best management practices to the land I own and rent and farm in an attempt to control erosion and to conserve soil moisture. I do not want a surface coal mine to move in next door and set up an operation that will ultimately drain my acres of highly productive farmland.

The most important thing that I want to say is that it took centuries for the superior land and water system to evolve in Salem Township. When the strip mine shovel comes in and turns the land upside down there is no way to put it back to its original state.

I want to ask: What right do we have, as stewards of the land, to destroy, in a period of just a few years, what took nature eons of time to perfect?

(Affidavit of Egbert Threw continued)

The instructions in the letter from Illinois Department of Mines and Minerals to Mr. Dennis Hartung, Manager of the Knox County Farm Bureau, August 16, 1989, were to forward to the Department, "evidence that <u>tends</u> to establish" the truth of claims of facts that are made in the Petition to Designate Certain Lands Unsuitable for Surface Coal Mining in Salem Township.

The word, "tends" means "to lead, or direct or move in a particular direction."

With this Affidavit I am binding over to the Department a statement of my own observations and evaluations according to the wisdom I have gained through years of farming experience.

I hope that the information contained in this Affidavit, telling the Department of my first-hand experience over the years, is evidence enough to "tend" to lead the Department to verify my credibility.

I will be interested in reading the material that the State publishes guaranteeing that surface coal mining does not adversely affect the water balance of the land adjacent to the surface mining operations.

Signed Egbert Threw
Egbert Threw

SUBSCRIBED AND SWORN TO before me

this 30 day of August 1989.

EAL"
LUMB [redacted]
[redacted]
My Co [redacted]

<u>Part N: Data Submitted as Supporting Evidence for Allegations concerning "Potential Loss of Water Quality and Quantity due to Surface Coal Mining Operations" as requested by August 16, 1989 letter from Illinois Department of Mines and Minerals</u>.

<u>Allegation</u> paragraph 2 on page 3 of the Petition:

"Surface Mining Operations would adversely effect the quality and quantity of the Petitioner's water flows causing damage to essential hydrologic function."

<u>Supporting Evidence</u>

Dynamiting the overburden, the caprock over the coal, and the coal itself can fracture the bedrock that holds the underground water system in place under the land. Mr. Lawrence Fisher, a retired civil engineer, presented this information at a public hearing, November 12, 1988, before the Trustees of the Village of Fairview, Illinois. Transcript Volume 5, pages 65-79.

If the bedrock of an area is fractured, the "old" water, water that was trapped in spaces above the bedrock in ages past, runs away through the cracks and breaks. So trying to drill past bedrock acquifers is not beneficial to landowners. It costs too much and the water brought up from the deepest depths is usually mineralized and not of good quality. Petitioners need good quality water for domestic and farming needs.

From the publication, "Hydrogeologic Aspects of Coal Mining in Illinois: an Overview," Illinois State Geological Survey, Environmental Geology Notes # 90, is this quotation:

> *"No extensive, systematic hydrogeology studies of an area before, during and after mining have been conducted; yet data resulting from such a study would make it*

> *possible to predict the effects of mining on surface flow and or ground water reservoirs, to anticipate water or water-related problems during mining."*

The Illinois State Geological Survey has no update to the "Environmental Geology Notes # 90."

In that same publication the survey reports that the local water table can be altered by surface mining operations and that as a result, dewatering of nearby wells occurs.

The Department of Mines and Minerals should have a thorough understanding of the geophysical makeup of this area before it permits any strip mining. No official in-depth geological studies of the Avon-Canton Quadrant have been made.

If the land identified in the Petition is strip mined, slurry from the mining pit must be treated before it can be discharged into a neighboring stream. In Permit Application # 227, on file at the Knox County Court House, and now under consideration by the Department, no mention was made about the future effects this mining operation will have on the land identified in the Petition. When the slurry pond now in use in Maquon Township, Section 36, is full, where will the operator go to dump the mine waste? The company may have to confine the waste on land adjacent to Petitioners' land.

When a mine effluent is pumped out of a pit the water table configuration is modified by being drained out of its source. Every farmer deals with the water table.

If surface coal mining operations did not affect the hydrolics of an area, the water settling basins of the operation would not

have to be specifically designed and placed in the exact location. Even with the best design they often overflow.

The "rills" or the long narrow trenches laid down on reclaimed land have caused many water-related problems. The rills conduct rainwater and cause overflows bearing contaminated sediment onto adjacent land.

The unnatural flows of water are not easily controlled. Company engineers can make mistakes in judgment. Even experts cannot predict that a strip mine operation will not damage an area.

<u>Allegation</u> paragraph 3 on page 4 of the Petition:

> "Surface mining operations would result in a substantial loss or reduction in water flows recharging the area and a 20 mile radius."

<u>Supporting Evidence</u>

Aquifers follow streams and rivers. Twenty miles is the area of the tributaties of the Spoon River radiating from the Petition site.

<u>Allegation</u> page 3 on page 4 of the Petition:

> "Operations could result in loss and/or reduction of long-range production of water supplies including damage to aquifers and aquifer recharge areas of land now supporting agricultural activity."

<u>Supporting Evidence</u>

Because they are prime, the soils in their present undisturbed

state on the lands identified in the Petition have the ability to hold water against the force of gravity until the ground reaches a saturated condition. Reconstructed surface mined soils do not have water-retention capabilities. They erode and they shift and they are difficult to work. Persons who farm strip mined ground know that this is true.

At a Illinois Department of Mines and Minerals Public Hearing in Oneida, Illinois, on September 12, 1979, Roger Winhorn, USDA-SCS Soil Survey technician, testified on pages 173-182 about the effect of surface mining operations on the water-holding capacity of the soil.

> *"Soil stockpiled becomes more massive. There is a lowering of permeability that allows water runoff. When the structure of the soil is gone, the space between soil pores is lost and the soils water-holding capability will be reduced."*

No matter how carefully reclaimed land is rebuilt, it will be compacted and will have lost its water-holding capacity.

Farmers don't farm just the surface soils. The darker top surface of the Tama-Ipava-Sable soils is not the complete world of the soil. The B and C horizons have the greatest water-holding capacity available to a plant.

In drought years there is less recharge to the soil from rainfall and also the water table is lowered so that there is an increased distance from the mine at which cropland can be affected.

The USDA Soil Conservation Service in "American Soil and Water: Conditions and Trends," December, 1980, states that, "Groundwater is becoming more scarce because the drawdown for the growth of crops is exceeding recharge." Therefore, in the corn belt region of the United States, if this region is to remain productive, the groundwater resource must be conserved and protected.

EXHIBIT A

PRESENTED BY:

Anna Sophia Johnson
Knox County
Rural Route Two
Wataga, IL 61488

AT: Public Hearing on Surface Mining
Salem Township, Knox County
Permit Application # 227

ON: June 8, 1989
Galesburg, Illinois

In 1977 when the Federal Surface Mining Act was enacted:

- The COAL INDUSTRY expressed assumptions about reclamation performance in the FUTURE.
- The PUBLIC expressed emotions about reclamation performance in the PAST.

Now in 1989, twelve years later, we have:

- Data to evaluate assumptions of COAL INDUSTRY.
- Data to evaluate emotions of PUBLIC.

Having Data means that we no longer have to rely on OPINION and HOPE for FUTURE ACTIONS.

DATA is the evidence that provides a reason for FUTURE ACTIONS.

SOILS IN PERMIT APPLICATION # 227

Tama 36B	19 acres	Productivity Index 153
Ipava 43 A	118 acres	Productivity Index 163
Sable 68	32 acres	Productivity Index 156

These soils in Permit Application # 227 are soils which are found in only a specific location in Illinois.

According to information from IDMM these soils are included in only three active surface mines in Illinois, those in West Central Illinois.

Permit Application # 227 is one location.

Permit Application # 227 is for land in which these soil types are predominate at one location.

My conjecture is (until I study the permits of the other two locations) that at the other two locations these soils are a minor portion of those mines.

Therefore, it is my conjucture (until I study further) that the information in this study relates solely to one active mine in Illinois and is not a precedent for other mines.

CAN THE TAMA, IPAVA, SABLE SOILS IN PERMIT APPLICATION # 227 BE RESTORED TO THE CAPABILITY EXISTING BEFORE MINING?

If IDMM says "YES" then Permit <u>can</u> be granted.

If IDMM says "NO" then Permit <u>cannot</u> be granted.

ILLINOIS LAW:

"Affected Lands shall be restored to a condition capable of supporting the use which it was capable of supporting prior to any mining ..."

Ch 96½ Ill. Rev. Stat. 7903.03

ILLINOIS LAW:

"It is the policy of the State to provide reclamation of lands affected by surface ... coal mining ... to aid in maintaining ... the tax base ... "

Ch 96½ Ill. Rev. Stat. 7901.02

STATEMENT ONE:

Illinois Reclamation Old Rule 1104 and
New Federal Reclamation Statute, Section 515 (B)(7) of the Act, which is 30 USC 1265,
are in practice
the same Reclamation Rule, the Highest Standard of Reclamation.

TESTIMONY TO THE UNITED STATES CONGRESS:

*"Illinois Rule 1104 adopted in 1975 provides
topsoil removal, soil handling and restoration techniques
that are very much consistent with
and formed a basis for Section 515 (B) (7) of the Act."*

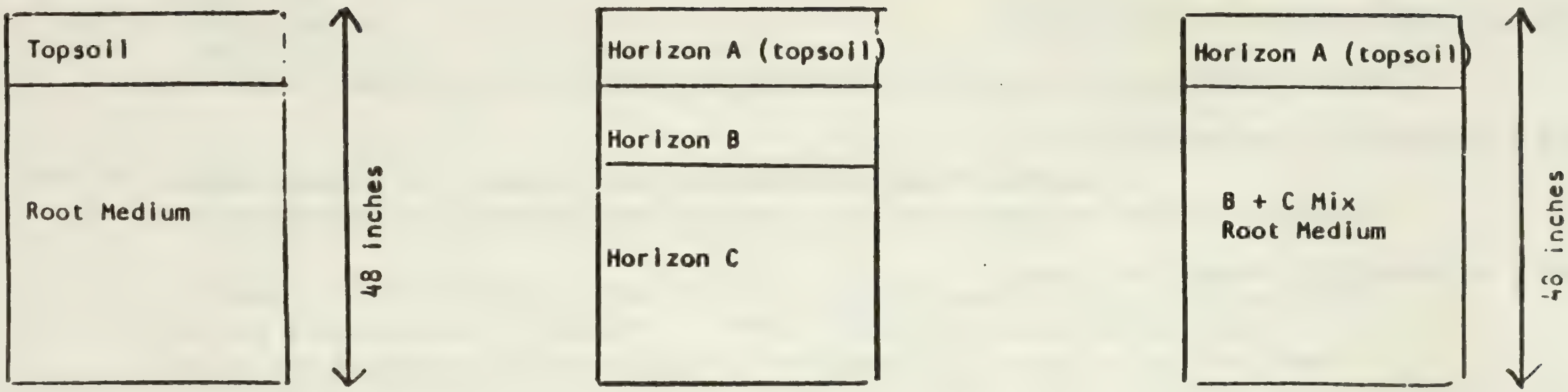
Douglas Downing, Supervisor
Land Reclamation Division
Illinois Department of Mines and Minerals
March 28, 1980

TESTIMONY TO THE UNITED STATES CONGRESS:

*"Prior to passage of (Federal Act),
Illinois had in place State Rule 1104
which as regards soil replacement
is essentially the same as
the current Federal prime farmland standards."*

Joe Spivey
Illinois Coal Association
March 28, 1980

Soil Profile State Rule 1104 adopted 1975 used since 1976	Soil Profile Federal Law 1977	Soil Profile Federal Law as Federal Rule as State Rule



HIGHEST STANDARD OF RECLAMATION IS ILLINOIS RULE 1104 WHICH IS:

- Same as Federal Standard Rule for Section 515 (B) (7) of the Act (30 CFR 1265). Rule is 30 CFR 823
- Same as State Standard Rule in Permanent Program. Prime Farmland is 62 Ill. Adm. Code 1823
  High Capibility is 62 Ill. Adm. Code 1825
  Prime and High Capibility Statute is 96½ Ill. Rev. Stat 7903.07
- Same as Reclaimed Soil Type Rapatee 872B.
- Same as Permit Application # 227.

Through Rulemaking's allowable substitutions, the Prime Farmland Soil Removal and Soil Replacement Standard of 62 Ill. Adm. Code 1823, the current Standard, has in fact become Illinois Old Rule 1104 which was initiated under Illinois State Law in 1975, put into effect in mining fields in 1976, and used ever since no matter under what Statute or Regulation it is identified.

To substantiate the fact that the Standard for Soil Replacement for Permit Application # 227 is that of Illinois Old Rule 1104, now the language of 62, Ill. Adm. Code 1825, now the allowable substitutions of 62 Ill. Adm. Code 1823, here are quotations from Permit Application # 227 Appendix F "Prime Farmland Restoration Plan:"

> *"The depth of the four soil cores varies from 20 to 30 feet which is the depth to the consolidated material. This would be the maximum depth the dragline would selectively place material in creating the proposed reconstructed root zone."*

Permit Application # 227 Appendix F page 2

> *"Mixing the B horizon and unconsolidated materials will provide a good root zone for crop production."*

Permit Application # 227 Appendix F page 2

> *"The relamation procedure proposed is similiar to the procedures used at the Elm and Rapatee mines ... "* (Note: The Elm mine closed many years ago)

Permit Application # 227 Appendix F page 3

> *"The B and C Horizon and below will be removed and selectively placed by the dragline..."*

Permit Application # 227 Appendix F page 5

> *"After the root medium material is approved ... "*

Permit Application # 227 Appendix F page 5

> *"Below the A Horizon will be the root medium mixture."*

Permit Application # 227 Appendix F page 9

The importance of determining that the standard of reclamation for # 227 will be Illinois Old Rule 1104 in fact, whether called by any other name, Statute, or Regulation, is that Illinois Old Rule 1104 reclamation has been in effect in mining fields in Illinois since 1976 and therefore can be studied and from that study it can be determined whether mined land can be returned to the capability that existed prior to mining.

CAN HIGHEST STANDARD OF RECLAMATION RESTORE:

TAMA SOIL ?
IPAVA SOIL ?
SABLE SOIL ?

DOCUMENTS USED TO LOCATE AND TO EVALUATE HIGHEST STANDARD OF RECLAMATION:

Document A - - Permit # 567-79 Is Reclamation to Rule 1104

Document B - - Soil Survey showing location of Reclaimed Soil Type Rapatee 872B
Is soil location of Permit # 567-79 reclaimed to Rule 1104

COMPARE DOCUMENT A AND DOCUMENT B. IN ORDER TO DETERMINE THAT RULE 1104 IS RECLAIMED SOIL TYPE RAPATEE 872B

REVIEW FOLLOWING DOCUMENTS TO REALIZE THAT <u>IN PRACTICE</u> THE RECLAMATION STANDARD IS THE <u>SAME</u>.

Document C - - Rule 1104

Document D - - Federal Act Section 515 (B) (7)

Document E - - State Act Ch 96½ Ill. Rev. Stat. 7903.07

Document F - - State Rule 62 Ill. Adm. Code 1823

Document G - - State Rule 62 Ill. Adm. Code 1825

MINED AND RECLAIMED SOIL TYPES IN KNOX COUNTY

There are two mined soil types in Knox County:

- Mined Soil Lenzburg 871 B-D-G
- Mined Soil Rapatee 872 B

This study does <u>not</u> focus on Mined Soil Type Lenzburg 871 B-D-G which is:

"old mine spoil areas"
"not reclaimed at all"
"of reclaimed only by some grading and leveling"

This study <u>does</u> focus on Mined Soil Type Rapatee 872B which is:

"more recent mine spoil"
"replacement of soil material"
"extensive grading and leveling"

AS PER PRECEDING PAGE, RAPATEE 872B is Old Illinois Rule 1104 which is <u>in</u> <u>practice</u> the Federal Standard.

Quotations are from <u>Soil Survey of Knox County</u> page 11.

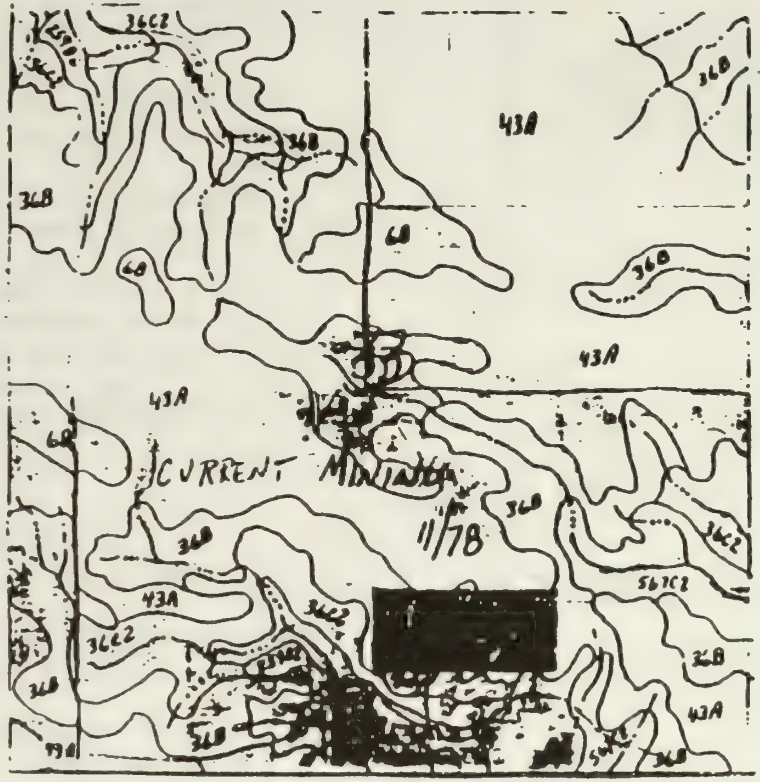
SOIL	*Tax Assessment Productivity Index	Equalized Assessed Value Per Acre
Unmined Tama 36	124	$ 307.50
Unmined Ipava 43A	130	$ 351.79
Unmined Sable 68	127	$ 329.64

These soils, mined and Reclaimed to the Highest Standard, result in:

SOIL	Tax Assessment Productivity Index	Equalized Assessed Value Per Acre
Mined Tama 36 becomes Rapatee 872B	104	$ 160.50
Mined Ipava 43A becomes Rapatee 872B	104	$ 160.50
Mined Sable becomes Rapatee 872B	104	$ 160.50

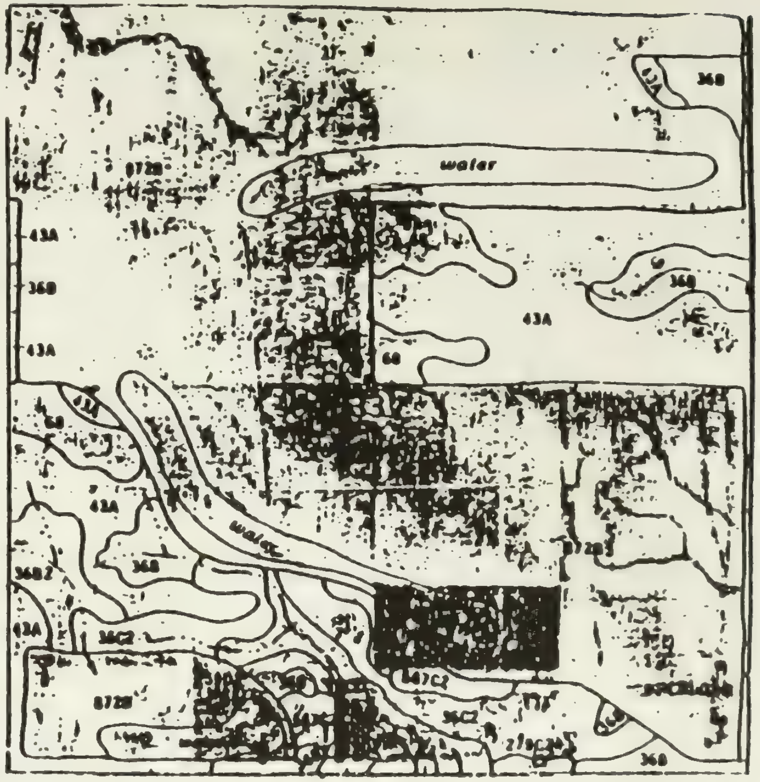
* Productivity Index for Tax Assessment purposes differs from Productivity Index for soil. The difference is that for Tax purposes a number is used that is the median between High & Basic Management.

BEFORE MINING
Section 33
Walnut Grove Township T 13 R 3
Knox County



***AFTER MINING**
Section 33
Walnut Grove Township T 13 R 3
Knox County

*Note: S 1/2 NE 33 was <u>not</u> mined



Tama 36B, Ipava 43A, Sable 68 mined and reclaimed to the Highest Standard become Reclaimed Soil Type Rapatee 872B.

SEE FOLLOWING PAGE FOR TAX ASSESSMENT AFTER MINING

TAX VALUATION
Section 33
Walnut Grove Township T 13 R 3
Knox County

ıma, Ipava, Sable Soils
ıined and reclaimed to
ghest Standard.

:e previous pages for
:fination of Highest Standard.

lote: S 1/2 NE 33 was
not mined.

ıis Highest Standard of
:clamation is the
:andard of reclamation
ılch is proposed to be used
ı Permit Application # 227.

ɔmpare 80 acres of unmined land
ith 80 acres of mined land.

ɔmpare 80 acres of unmined land
ith 160 acres of mined land.

ıis comparison will show
ıat will happen to tax valuation
ıen Tama, Ipava, Sable Soils
f Permit Application # 227
re mined and reclaimed to
ıe Highest Standard of
eclamation.

Parcel 0333100001 N 1/2 N 1/2 S 33 T 13 R 3 MINED 160 Acres $ 24,375 valuation	
Parcel 0333100002 S 1/2 NW S33 T 13 R 3 MINED 80 acres $12,854 valuation	Parcel 0333200001 S 1/2 NE S33 T13 R3 UNMINED 80 acres $ 26,996 valuation
Parcel 0333300001 SW S33 T13 R3 PARTIALLY MINED 160 acres $ 32,898 valuation	Parcel 0333400001 SE S33 T13 R3 MINED 160 acres $ 24,824 valuation

STATEMENT TWO:

Soil Types Tama 36B,
Ipava 43A
Sable 68

mined and reclaimed to the Highest Standard

becomes Reclaimed Soil Type Rapatee 872B.

Tax assessment value of Reclaimed Soil Type Rapatee 872B

is one-half that of

unmined Tama, Ipava, Sable soils.

REAL ESTATE MARKET VALUE, YEAR 1981:

Unmined Tama, Ipava, Sable soil	$3,500 per acre
	$3,300 per acre
	$3,200 per acre

Mined tama, Ipava, Sable soil reclaimed to Highest Standard $1,500 per acre (Documents H, I, J)

SEE DOCUMENT H Real Estate Sale Letter
DOCUMENT I Description of Parcels
DOCUMENT J Location of Parcels on Plat

PARCEL # 52 reads:

"150 acres all surfaced mined, reclaimed, and topsoil replaced. Currently in wheat. Large lake on property."

Documents H, I, J

CONCERNING PARCEL # 52:

Document A for Permit showing Section 10 to be mined to Highest Standard.
Document B for location of parcel # 52 on soil map.

STATEMENT THREE:

Tama, Ipava, Sable soil, mined and reclaimed to Highest Standard is worth one-half that of unmined Tama, Ipava, Sable soil.

<u>CONCLUSION:</u>

Can Tama, Ipava, Sable soils reclaimed to Highest Standard be restored to the capability existing prior to mining?

The answer is NO.

Can Tama, Ipava, Sable soils reclaimed to Highest STandard maintain the tax base?

The answer is NO.

If IDMM <u>accepts</u> the Three Statements of this study, IDMM <u>cannot</u> issue Permit Application # 227.

If IDMM <u>rejects</u> the Three Statements of this study, IDMM <u>can</u> issue Permit Application # 227.

TO REJECT <u>STATEMENT ONE</u> (Soil Reclamation Standard), IDMM will have to say:

"IDMM and the Coal Association <u>made a mistake</u> when we testified to Congress."

TO REJECT <u>STATEMENT TWO</u> (Tax Assessment Value), IDMM will have to say:

"USDA-SCS <u>made a mistake</u> on the Soil Survey,"

"Illinois Department of Revenue <u>made a mistake</u> on rules for Tax Assessment."

TO REJECT <u>STATEMENT THREE</u> (Real Estate Market Value), IDMM will have to say:

"Land appraisers <u>made a mistake</u> on appraising real estate."

COMMENT FROM THIS RESEARCHER:

My intent is to be <u>accurate</u>.

If you know how I can improve this presentation, please share your information with me.

If you know a group who would like for me to make this presentation to them, I would be glad to oblige.

Anna Sophia Johnson
R. R. 2
Wataga, IL 61488

EXHIBIT B

Date: June 28, 1989

TO: Surface Mining Advisory Committee
Illinois Department of Mines and Minerals

RE: Surface Mining Permit Application #227
Northwest Quarter of Section 28, T9N, R4E, Knox County, Illinois

FROM: Charles H. McKie, Appraiser
358 Columbus Ave.
Galesburg, IL 61401

SELECTED COMPARATIVE DATA

	BEFORE MINING	AFTER MINING	% OF UNMINED
1. Cropland	97%	86%	
2. Average Productivity Index	158	95	60%
3. Conservation Planning--Highly Erodible Soils (HEL)	Virtually no restrictions. Continuous row crop.	Soil Group 3 -Fragile Soil -Eliminates 30% of 112 rotation options. -Assuming no intensive practices such as contouring, terracing -Best option - Corn, Soybeans, Small grain, and Hay.	
4. Projected Income a. Gross Income	$59,000	$27,000	45%
b. Net Income (after direct costs only)	$40,000	$14,271	36%

5. Land Use

	Before Mining (Ac.)	Before Mining (%)	After Mining (Ac.)	After Mining (%)
Crops	155 Ac.	96.875%	137 Ac.	85.625%
Buildings	3	1.875%	----	----
Pasture	---	----	10	6.25
Water	---	----	11	6.875
Roads	2	1.250	2	1.250
Total	160 Ac.	100.0 %	160 Ac.	100.0 %

6. Cropping Program

	Before Mining		After Mining
Corn	77.5 Ac @ 157=	12,167 bu.	34 Ac @ 100= 3,400 bu.
Soybeans	77.5 Ac @ 50=	3,875 bu.	34 Ac @ 35= 1,190 bu.
Wheat	---	-----	34 Ac @ 47= 1,598 bu.
Hay	---	-----	34 Ac @ 4.2= 143 tons
	155.0 Ac		136 Ac

7. Projected Income, Direct Cost, and Net Income (after direct costs)

A. Before Mining

	Income		Direct Cost	
Corn	12,167 bu @ $2.55=	$31,026	77.5 Ac @ $150=	$11,625
Soybeans	3,875 bu @ 7.15=	27,706	77.5 Ac @ 85=	6,507
		$58,732		$18,132
	-	18,132		
	Net Income	$40,600		

B. After Mining - Assuming 872B - Rapattee Soil

	Income		Direct Cost	
Corn	3,400 bu @ $2.55=	$ 8,670	34 Ac @ $115=	$3,910
Soybeans	1,190 bu @ 7.15=	8,508	34 Ac @ 75=	2,550
Wheat	1,598 bu @ 3.80=	6,072	34 Ac @ 56=	1,904
Hay	143 tons @ 25.00=	3,575	34 Ac @ 110=	3,740
		$26,825		$12,104
	-	12,104		
	Net Income	$14,721		

RE: Mining Permit Appl #227
Knox County, Illinois

ASSUMPTIONS USED IN ANALYSIS

1. Reclaimed land will be mapped as 872B - Rapattee and not 871B - Lenzburg

2. Reclaimed land will have no intensive practices, such as contouring, terracing, etc., applied. Cost of such practices are not applied to income projections.

3. Direct Costs included in analysis - 340-499 acres farm basis.
   a. Power & machinery - depreciation, repairs, fuel, custom machine hire, custom hauling and trucking.
   b. Seed
   c. Interest on operating capital
   d. Sprays and other materials
   e. Drying costs for corn

4. Costs NOT included in analysis
   a. Land cost
   b. Interest on land debt
   c. Taxes
   d. Labor
   e. Return to Management
   f. Fertilizer and limestone

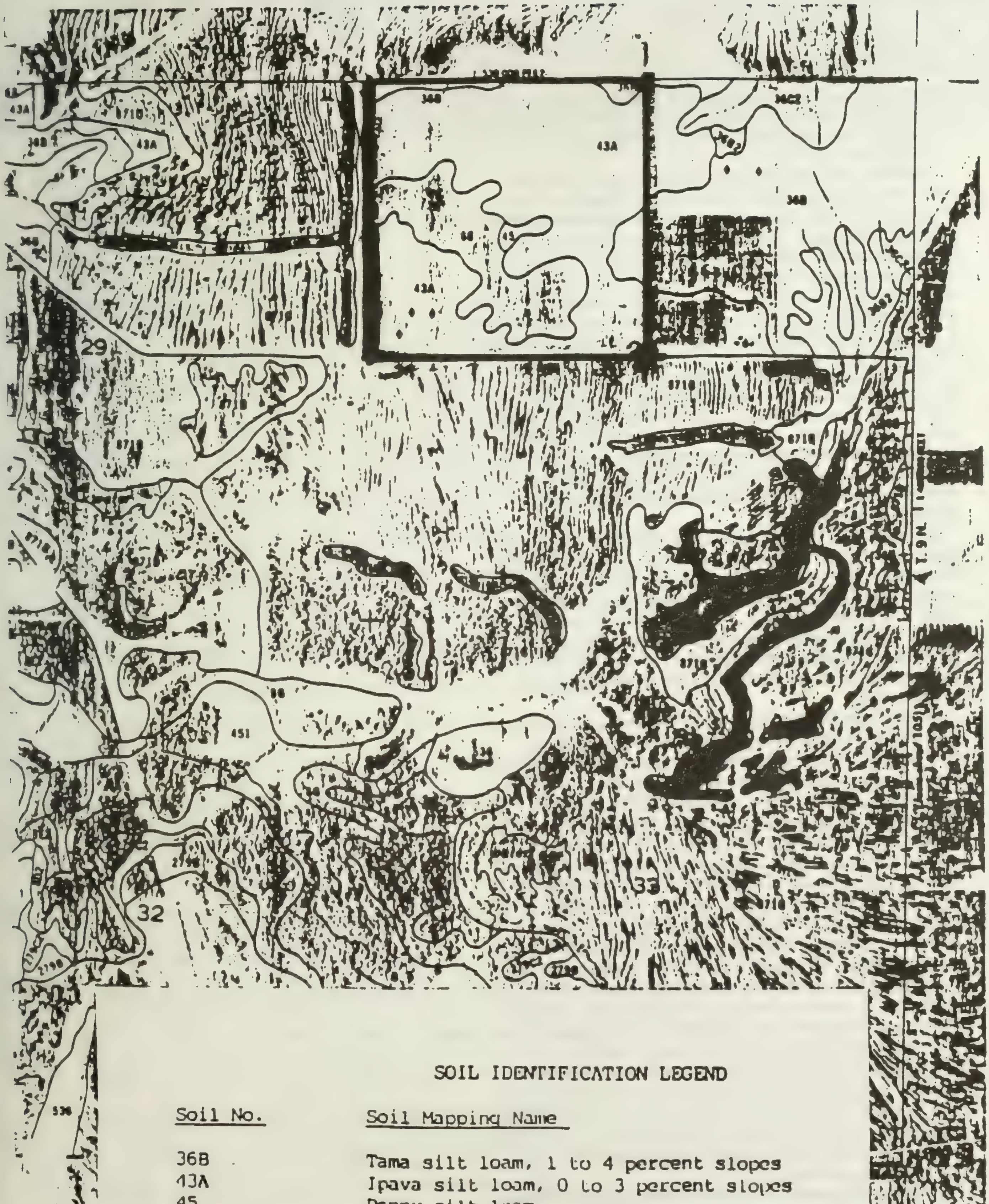
REFERENCES

1. Soil Survey of Knox County, Illinois. United States Department of Agriculture Soil Conservation Service in cooperation with Illinois Agricultural Experiment Station. (Illinois Agricultural Experiment Station Soil Report No. 121).

2. Conservation Planning Booklet, Knox County, Illinois. Knox County Soil Conservation Service.

3. Farm Management Manual, Dept. of Agricultural Economics, College of Agriculture, University of Illinois. Publication AE-4773; Spring, 1989 edition.

4. 1976 Aerial Photo for Knox County, Illinois.



SOIL IDENTIFICATION LEGEND

Soil No.	Soil Mapping Name
36B	Tama silt loam, 1 to 4 percent slopes
43A	Ipava silt loam, 0 to 3 percent slopes
45	Denny silt loam
68	Sable silty clay loam

872B—Rapatee silty clay loam, 1 to 7 percent slopes. This gently sloping, well drained soil is in surface-mined upland areas that have been reclaimed. Individual areas are irregular in shape and range from 40 to 340 acres in size.

Typically, the surface layer is mixed black and very dark gray, friable silty clay loam about 3 inches thick. The upper part of the underlying material is mixed black and very dark gray, very firm silty clay loam about 15 inches thick. The next part is dark yellowish brown, very firm silty clay loam about 22 inches thick. The lower part to a depth of 60 inches is mixed brown, yellowish brown, and greenish gray, calcareous, very firm clay loam. It has a few coal and shale fragments. In places the mine spoil material is at the surface.

Included with this soil in mapping are small areas of the somewhat poorly drained Ipava, poorly drained Sable, and moderately well drained Tama soils. These soils are along the borders of the mapped areas. Also included are some steep areas adjacent to pits and the final cut and areas of shallow depressions, some of which contain water. Included areas make up 10 to 15 percent of the unit.

Air and water move through the Rapatee soil at a very slow rate. Surface runoff is medium in cultivated areas. Available water capacity is moderate. Organic matter content also is moderate. The surface layer is slightly acid. The underlying material is slightly acid in the upper part and mildly alkaline in the lower part. The dense underlying material tends to restrict roots. The shrink-swell potential is moderate, and the potential for frost action is high.

Most areas are cultivated (fig. 10). This soil is well suited to cultivated crops and moderately suited to pasture and hay. It is moderately suited to dwellings and poorly suited to septic tank absorption fields.

In areas used for corn, soybeans, or small grain, erosion is a hazard. Also, the moderate available water capacity and restricted root zone are limitations. Erosion can be controlled by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, by terraces, or by a combination of these. The crop residue on the surface conserves moisture. Selection of short-season or drought-tolerant crop varieties can lessen the extent of crop damage.

Adapted forage and hay plants grow well on this soil. Overgrazing causes surface compaction and excessive runoff and increases the susceptibility to erosion. Proper stocking rates, rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and help to control erosion.

If this soil is used as a site for dwellings, the shrink-swell potential is a limitation. Reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

If this soil is used as a site for septic tank absorption fields, the very slow permeability is a limitation. Increasing the size of the filter field or replacing the with more permeable material helps to overcome thi limitation.

The land capability classification is IIe.

EXHIBIT C

News Release

Carl Sandburg College

OFFICE OF PUBLIC INFORMATION • 2232 S. LAKE STOREY RD. • GALESBURG, IL 61401 • (309) 344-2518, EXT. 242

Contact: Jeff Rankin, coordinator of public information

TAX SURCHARGE WELCOME, BUT NOT SUFFICIENT, SAYS CSC PRESIDENT

For immediate release
July 19, 1989
89-90-007-007

The recently enacted temporary surcharge on the Illinois income tax, designed to generate much-needed revenues for state-supported education, will have a negligible effect on Carl Sandburg College's financial outlook, CSC President Jack Fuller said today.

"The estimated $287,000 in new revenues the college will realize from the surcharge will be outweighed by increases in insurance and energy costs, and a continuing decrease in property-tax revenue," Fuller explained.

The surcharge bill, sponsored by Illinois Speaker of the House Michael Madigan (D-Chicago), and voted into law last month, is expected to raise an additional $783 million over the next two years, $106 million of which will be earmarked for higher education. Of that amount, only $14.8 million will be channeled to the state's 39 community colleges. Carl Sandburg College's share of the revenues will be $287,756, but the college's net revenues will only be $123,404, as the remaining revenues must be applied to restricted accounts.

Fuller said that while the new revenues are welcome, they will do little to improve the financial resources of the college, which has faced a deficit budget since 1987. "This year alone, our health and medical insurance costs will increase approximately 45 percent, and utility costs will continue to rise," he said. "At the same time, we will be losing $76,000 in property tax revenues, due to declining assessed valuation of land in the district."

The surcharge benefits will be further diluted, Fuller said, because $93,000, or 32 percent of the revenues, will be applied to the college's educational program at the Hill Correctional Center, a separate contractual agreement with the Illinois Department of Corrections.

Fuller said the new revenues will have little or no effect on the college's plans to seek a 12.5-cent property tax increase through a referendum this fall. "Despite the surcharge, our expenditures will still exceed our revenues," he said. "We have been prudent with our resources and have not sought a referendum in nearly 10 years, but in order to maintain the quality of our programs, we are now obliged to seek new sources of income.

"A temporary, two-year tax increase to assist education is better than no increase, but it does little to insure the long-term stability of institutions such as Carl Sandburg College."

\# # #

MLCR 1

Surface Mining Permit

Surface Mining Permit or amend. from July 1, 19 76 to June 30, 19 ___.

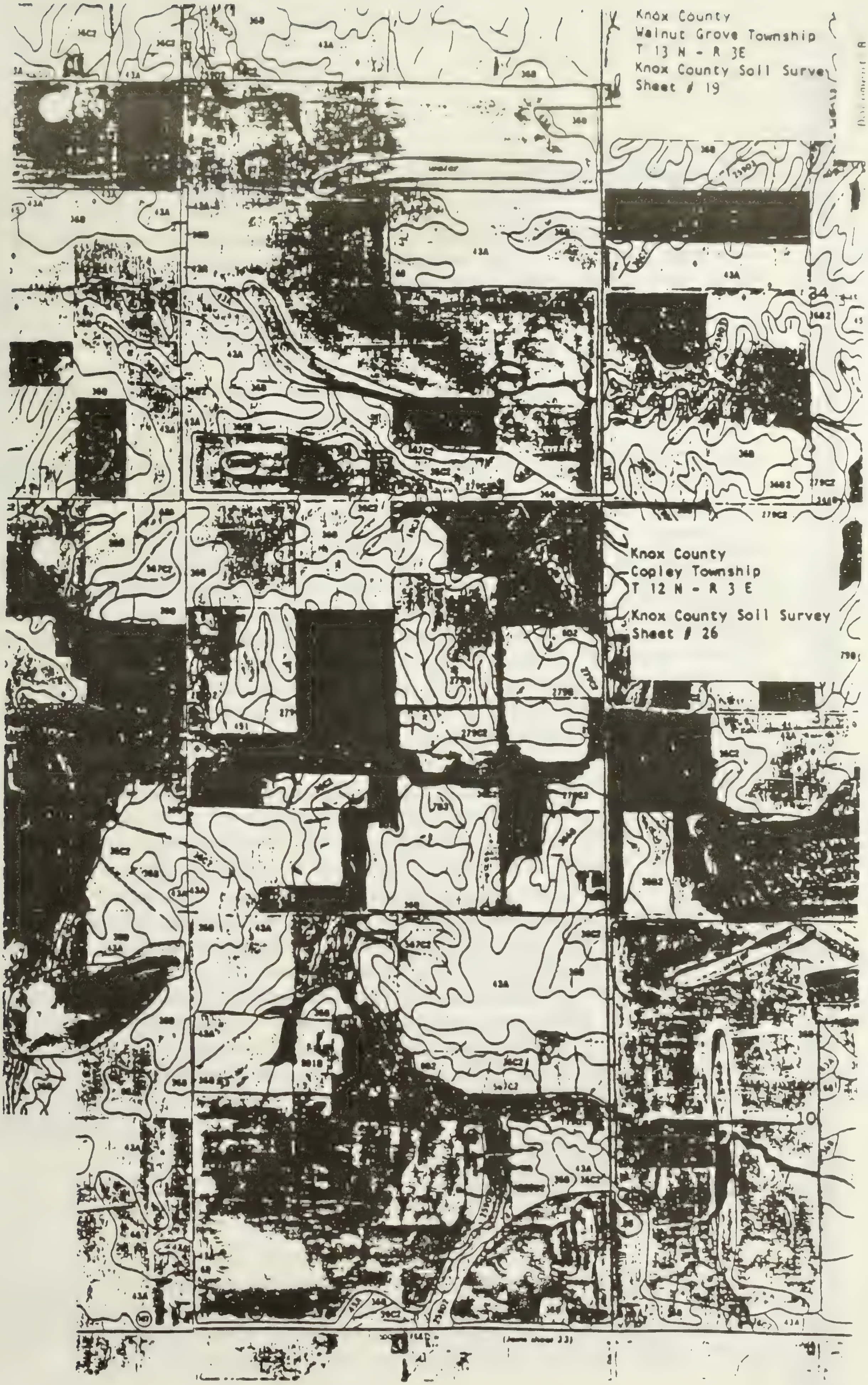
Name of Mine	Address	Pit No. or Name	Est. Acres to be affected	Location			
				Sec.	Twp.	Range	County
Mecco	Victoria, Ill.		1104	8, 9, 10, 11, 12	12N	3E	Knox
				33	13N	3E	Knox

15. A conservation and reclamation plan for each pit or mine operation of the lands to be affected including a map of the area with the different reclamation methods, and all other pertinent information. A copy of the plan and map with the same scale as recommended in Rule 1601 is to be filed with the county clerk in duplicate in each county having lands to be affected. Receipt of filing with the county clerk is to be included with the plan and map forwarded to the Department.

Before mining, a portion of the area was cropland planted to corn, soybeans, oats, wheat and hay with average yields for the district. Part of the area was also used for livestock on farms. The area before mining was flat to rolling, with some eroded slopes. The areas to be mined are in Sections 8,9,10,11,12 Copley Township, Range 12N.-R.3E. Also Section 33, Walnut Grove Township 13N. R. 3E. The major soil types in Sections 8,9,10,11,12 are the Tama-Muscatine Association. In Section 33 the soils are Muscatine-Sable Association. (See attachments) The proposed land use after mining will be Reclamation of the area to row crop and pasture to conform to Rule 1104, on the row crop areas with texture compliance stated in Rule 1104 of the rules and regulations. The grading will be done to conform to the original grade existing prior to mining. The area will be graded and seeded for pasture. The selection of pasture after mining is to give the soil time to replace organic matter, bacteria, fungi, and other microorganisms. The planting of legumes and grasses will hasten the accumulation of organic matter and soil formation. Planting as soon as the area has been released will help

Proposed Plan: This copy to be filed with county clerk. Receipt of filing is required (Form MLCR 1a) and shall be attached to Application for Surface Mining Permit.

Document A


Knox County
Walnut Grove Township
T 13 N - R 3E
Knox County Soil Survey
Sheet # 19
Knox County
Copley Township
T 12 N - R 3 E
Knox County Soil Survey
Sheet # 26

Rule 1103 --- Land Not Requiring Reclamation

In cases where pools or lakes capable of supporting aquatic life may be formed by rainfall or drainage runoff from adjoining land, the depressed haulage roads or final cuts or any other area to be occupied by pools or lakes, if approved by the Department, shall not require any further reclamation. Where the Director determines that a road, dry pit bottom or ditch is consistent with and necessary to the conservation and reclamation plan for an area, no further reclamation shall be required.

Rule 1104 --- Land To Be Reclaimed For Row Crop Agriculture

When the Director determines that the land to be affected is (1) capable of being reclaimed for row-crop agricultural purposes and suitable for row-crop agricultural purposes based on United States Soil Conservation Service soil survey classifications of the affected land prior to mining, and (2) when the Director determines that the optimum future use of the land affected is for row-crop agricultural purposes, the affected land shall be graded to the approximate original grade of the land and all or part of the darkened surface soil, as defined in this Act, shall be segregated during the stripping process and replaced as a final cover as a last step in the required grading. When available in such depth, at least 18 inches of the darkened surface soil shall be segregated and replaced. When less than 18 inches of darkened surface soil exists all such lesser amounts shall be segregated and replaced. In no case shall less than the top 8 inches of surface soil, darkened or not, be segregated and replaced. This segregation and replacement requirement may be altered by the Department only if it is determined upon the advice of competent soil scientists that other material available in the cast overburden would be suitable in meeting the reclamation requirements. Below the darkened surface soil the replaced material shall be suitable as an agricultural root medium. The Department shall determine by rules and regulations what [illegible] suitable agricultural root medium by compositio[illegible] On all lands to be reclaimed the operator shall not [illegible] to create a soil condition better than that which exis[illegible] surface mining.

Slope classifications of lands before mining are (a) 0 to 2%; (b) 2 to 5%; (c) 5 to 10%.

Approximate original grade means the grading of affected lands which were originally of the (a) and (b) slope classifications to a maximum slope not to exceed 5% slope with a planned erosion control system approved by the Director for 3 to 5% slopes.

Document C

Approximate original grade means the grading of affected lands which were originally of the (c) 5 to 10% slope to a maximum slope not to exceed 10% and shall have a planned erosion control system approved by the Director.

Planned terrace systems, when utilized as part of a planned erosion control system, shall be constructed according to U.S. Department of Agriculture Soil Conservation Service specifications.

Slopes on all affected lands shall be measured from the drainage divide to the base of the slope or to the intermittent water course as the lowest point. Abrupt slope changes between these points are not acceptable except for unusual conditions such as ditches, terraces, and roads.

The length of slope and contour of the restored surface shall be conducive to those farming operations normally associated with row crop production. Farming operations as used here shall include such measures or practices necessary to provide adequate drainage and erosion control for sustained row crop production.

The materials under the darkened surface soil suitable as a root medium shall contain no more than 20% coarse material greater than 2mm in size by volume. No more than half of the coarse material may be between 3 inches and 10 inches in the greatest dimension. No fragments shall be greater in size than 10 inches in the greatest dimension. In no case may clay material of less than 2 microns be greater than 40% by weight.

These texture requirements do not apply if the soil conditions of the affected land prior to mining did not meet the standards included herein (i.e., if more than 20% coarse material by volume existed in the root medium below the darkened surface soil prior to mining, the same percentage of coarse material in the root medium will be [illegible] after mining; if more than one-half of the coarse [illegible] consisted of rocks in the 3 to 10 inch size category prior [illegible] that same percentage will be permitted after mining; [illegible] than 40% by weight of clay materials less than 2 microns [illegible] existed in the root medium below the darkened surface soil prior to mining, a like percentage by weight will be allowed after mining in the material under the darkened surface soil.)

In addition to meeting texture requirements, the materials under the darkened surface soil, must be chemically suitable as an agricultural root medium. Materials suitable as an agricultural root medium shall be of a vertical thickness adequate

including the darkened surface soil, to ensure a total depth of four feet. Pyritic material capable of producing toxic acidic conditions shall not be incorporated within the surface four foot layer of finally graded lands.

The Director may alter the slope and texture requirements under this Rule only upon a clear and convincing showing that to vary such requirements would better effectuate the purposes of this Act than would enforcing the standards herein.

Location of texture compliance samples will be determined by random methods similar to those described in Rule 1202 (b) (1) of the Rules and Regulations and texture analysis shall be determined by methods as subscribed by the Department.

The final cut and submerged roadways may remain if the Department determines that such final cut or roadway could form a water impoundment capable of supporting desirable uses such as water for livestock or wildlife; and if to be used for fish life, shall have minimum depths in accordance with standards for fish stocking as recommended by the Department. All impoundments and structures must be included in the reclamation plan for approval or disapproval by the Department. The boxcut spoil shall be graded in accordance with Section 6 of the Act, and with these Rules and Regulations.

Document D

ENVIRONMENTAL PROTECTION PERFORMANCE STANDARDS

30 USC 1265.

SEC. 515. (a) Any permit issued under any approved State or Federal program pursuant to this Act to conduct surface coal mining operations shall require that such surface coal mining operations will meet all applicable performance standards of this Act, and such other requirements as the regulatory authority shall promulgate.

General standards.

(b) General performance standards shall be applicable to all surface coal mining and reclamation operations and shall require the operation as a minimum to—

Fuel, maximum use.

(1) conduct surface coal mining operations so as to maximize the utilization and conservation of the solid fuel resource being recovered so that reaffecting the land in the future through surface coal mining can be minimized;

Land use, restoration.

(2) restore the land affected to a condition capable of supporting the uses which it was capable of supporting prior to any mining, or higher or better uses of which there is reasonable likelihood, so long as such use or uses do not present any actual or probable hazard to public health or safety or pose any actual or probable threat of water diminution or pollution, and the permit applicants' declared proposed land use following reclamation is not deemed to be impractical or unreasonable, inconsistent with applicable land use policies and plans, involves unreasonable delay in implementation, or is violative of Federal, State, or local law;

Prime farm lands

(7) for all prime farm lands as identified in section 507(b) (16) to be mined and reclaimed, specifications for soil removal, storage, replacement, and reconstruction shall be established by the Secretary of Agriculture, and the operator shall, as a minimum, be required to—

(A) segregate the A horizon of the natural soil, except where it can be shown that other available soil materials will create a final soil having a greater productive capacity; and if not utilized immediately, stockpile this material separately from other spoil, and provide needed protection from wind and water erosion or contamination by other acid or toxic material;

(B) segregate the B horizon of the natural soil, or underlying C horizons or other strata, or a combination of such horizons or other strata that are shown to be both texturally and chemically suitable for plant growth and that can be shown to be equally or more favorable for plant growth than the B horizon, in sufficient quantities to create in the regraded final soil a root zone of comparable depth and quality to that which existed in the natural soil; and if not utilized immediately, stockpile this material separately from other spoil, and provide needed protection from wind and water erosion or contamination by other acid or toxic material;

(C) replace and regrade the root zone material described in (B) above with proper compaction and uniform depth over the regraded spoil material; and

(D) redistribute and grade in a uniform manner the surface soil horizon described in subparagraph (A);

7903.04. Grading

§ 3.04. Grading. (a) Affected land shall be backfilled, compacted (where advisable to insure stability or to prevent leaching of toxic materials), and graded in order to restore the approximate original contour of the land. All highwalls, spoil piles, and depressions shall be eliminated (unless small depressions are needed in order to retain moisture, to assist revegetation, or as otherwise authorized under this Act).

(b) In surface mining which is carried out at the same location over a period greater than one year where the operation transects the coal deposit, and the thickness of the coal deposits relative to the volume of the overburden is large and where the operator demonstrates that the overburden and other spoil and waste materials at a particular point in the permit area or otherwise available from the entire permit area are insufficient, giving due consideration to volumetric expansion, to restore the approximate original contour, the operator, at a minimum, shall backfill, grade, and compact (where advisable) using all available overburden and other spoil and mine waste materials to attain the lowest practicable grade, but not more than the angle of repose, to provide adequate drainage and to cover all acid-forming and other toxic materials, in order to achieve an ecologically sound land use compatible with the surrounding region.

(c) Where the operator demonstrates that due to volumetric expansion the amount of overburden and other spoil and waste materials removed in the course of the mining operation is more than sufficient to restore the approximate original contour, the operator shall satisfy the requirements set forth in subsection (a) of this Section, and shall backfill, grade and compact (where advisable) the excess overburden and other spoil and waste materials to attain the lowest grade but not more than the angle of repose, and to cover all acid-forming and other toxic materials, in order to achieve an ecologically sound land use compatible with the surrounding region and such overburden and spoil shall be shaped and graded in such a way as to prevent slides, erosion, and water pollution, and shall be revegetated in accordance with the requirements of this Act.

(d) Water impoundments which were not part of the original contour may be permitted by the Department under Section 3.08.[1]

[1] Paragraph 7903.08 of this chapter.

7903.05. Stabilization

§ 3.05. Stabilization. All surface areas, including spoil piles, affected by the surface mining and reclamation operation shall be stabilized and protected to effectively control erosion and attendant air and water pollution.

7903.06. Topsoil

§ 3.06. Topsoil. (a) The topsoil shall be removed from the land in a separate layer, replaced on the backfill area, or if not used immediately, segregated in a separate pile from other spoil. When the topsoil is not replaced on a backfill area within a time short enough to avoid deterioration of the topsoil, a successful cover shall be maintained by quick-growing plant or other means thereafter so that the topsoil is preserved from wind and water erosion, remains free of any contamination by other acid or toxic material, and is in usable condition for sustaining vegetation when restored during reclamation.

(b) If topsoil is of insufficient quantity or of poor quality for sustaining vegetation, or if other strata or combinations of strata can be shown to be more suitable for vegetation requirements, then the operator shall remove, segregate, and preserve in a like manner such other strata which are best able to support vegetation.

(c) The topsoil, or the best available subsoil or combination of soil which is best able to support vegetation, shall be restored.

(d) The term "topsoil" shall be defined by the Department by rule. Such definition shall consider regional differences in conditions in this State.

7903.07. Prime farmlands and high capability lands

§ 3.07. Prime Farmlands and High Capability Lands. (a) For all prime farmlands to be mined and reclaimed, the operator shall, as a minimum, (1) segregate the A horizon of the natural soil, except where it can be shown that other available soil materials will create a final soil having a greater productive capacity, and if not used immediately, stockpile this material separately from other spoil, and provide needed protection from wind and water erosion or contamination by other acid or toxic material; (2) segregate the B horizon of the natural soil, or underlying C horizons or other strata, or a combination of such horizons or other strata that are shown to be both texturally and chemically suitable for plant growth and that can be shown to be equally or more favorable for plant growth than the B horizon, in sufficient quantities to create in the regarded final soil a root zone of comparable depth and quality to that which existed in the natural soil, and if not used immediately, stockpile this material separately from other spoil, and provide needed protection from wind and water erosion or contamination by other acid or toxic material; (3) replace and regrade the root zone material described in (2) above with proper compaction and uniform depth over the regraded spoil material; and (4) redistribute and grade in a uniform manner the surface soil horizon described in subparagraph (1) above.

(b) For all high capability lands to be mined and reclaimed, all or part of the darkened surface soil shall be segregated and replaced as a final cover as a last step in the required grading. When available in such depth, at least 18 inches of the darkened surface soil shall be segregated and replaced. In no case under this subsection shall less than the top 8 inches of surface soil, darkened or not, be segregated or replaced. This segregation and replacement requirement may be altered by the Department only if it is determined on the advice of competent soil scientists that other material available in the cast overburden would be suitable in meeting the reclamation requirements. Below the darkened surface soil, the replaced material shall be suitable as an agricultural root medium. The Department shall determine by rule what constitutes a suitable agricultural root medium by composition and depth. This Section does not apply to any land which is subject to a reclamation plan approved under "The Surface-Mined Land Conservation and Reclamation Act," approved September 17, 1971, as amended, as in effect on June 30, 1979,[1] or to high capability lands affected by mining operations prior to July 1, 1975.

(c) The term "prime farmland" has the same meaning it has under the Federal Act.[2] Soil horizons shall be defined by the Department by rule. Such rules shall be consistent with the Federal Act.

Section 1823.14 Prime Farmland: Soil Replacement

Surface coal mining and reclamation operations on prime farmland shall be conducted according to the following:

a)

1) The minimum depth of soil and soil material to be reconstructed for prime farmland shall be forty-eight (48) inches except where a natural rock formation occurs at shallower depths. The Department shall specify a depth greater than forty-eight (48) inches wherever necessary to restore productive capacity due to uniquely favorable soil horizons at greater depths; and

2) Section 1823.14(a)(1) and (d) shall not apply to prime farmland and fragipan soils. Prime farmland fragipan soil shall be reconstructed in accordance with 62 Ill. Adm. Code 1825.14(a)(1), (a)(2), (a)(3), and (a)(5). For the purposes of this provision, prime farmland fragipan soils are specific soils classified as prime farmland that are underlain with a diagnostic subsurface horizon designated as a fragipan by the Soil Conservation Service of the U.S. Department of Agriculture according to the criteria set in Soil Taxonomy, U.S.D.A. Handbook AH 436, including the following soils found in Illinois: Ava, Grantsburg, and Hosmer series as defined by the Soil Interpretation Sheets of the Soil Conservation Service.

b) Replace soil material only on land which has been first returned to final grade and scarified according to 62 Ill. Adm. Code 1816.101 through 1816.105 or 62 Ill. Adm. Code 1817.101 through 1817.105, unless site-specific evidence is provided and approved by the Department showing that scarification will not enhance the capability of the recommended soil to achieve equivalent or higher levels of yield;

c) Replace the soil horizons or other suitable soil material in a manner that avoids excessive compaction;

d) Replace the B horizon or other suitable material specified in Section 1823.12(a)(2) and (a)(3) to the thickness needed to meet the requirements of paragraph (a) of this Section;

e) Replace the A horizon or other suitable soil materials specified in Section 1823.12(a)(1) as the final surface soil layer. This surface soil layer shall equal or exceed the thickness of the original soil, as determined in 62 Ill. Adm. Code 1785.17(b)(1)(B) and be replaced in a manner that protects the surface layer from wind and water erosion before it is seeded or

Document 6

Section 1825.14 High Capability Lands: Soil Replacement

Surface mining operations on high capability lands shall be conducted according to the following:

a) The operator shall establish a suitable rooting medium.

1) Texture. In order to be of suitable texture, the materials under the darkened surface soil suitable as a root medium shall contain no more than twenty percent (20%) coarse material (greater than two (2)mm in size) by volume. No more than half of the coarse material may be between three (3) inches and ten (10) inches in the greatest dimension. No fragments shall be greater in size than ten (10) inches in the greatest dimension. In no case may clay material of less than two (2) microns be greater than forty percent (40%) by weight of the soil size material nor shall the sand size material of greater than fifty (50) microns be greater than sixty percent (60%) by weight of the soil size material, when clay material content is less than twenty percent (20%) by weight.

A) Rapid weathering coarse material, as determined by the Department, may be included in the root medium. If these fragments are allowed, they shall be included in the soil fraction for texture determination and shall not be included in the coarse fragment portion of texture evaluation.

B) These texture requirements do not apply if the soil conditions of the affected land prior to mining did not meet the standards included herein (i.e., if more than twenty percent (20%) coarse material by volume existed in the root medium below the darkened surface soil prior to mining, the same percentage or coarse material in the root medium will be allowed after mining; if more than one-half (1/2) of the coarse material consisted of rocks in the three (3) to ten (10) inch size category prior to mining, the same percentage will be permitted after mining; and if more than forty percent (40%) by weight of clay materials less than two (2) microns in size; and if more than sixty percent (60%) by weight of sand when clay material content is less than twenty percent (20%) by weight existed in the root medium below the darkened surface soil prior to mining, a like percentage by weight will be allowed after mining in the material under the darkened surface soil).

2) Chemical Properties. The materials under the darkened

surface soil must be chemically suitable as an agricultural root medium. Toxic material capable of producing chemically unsuitable conditions shall not be incorporated within the material used to create the root zone established for these lands.

3) Depth. The combined vertical thickness of the darkened surface soil and the agricultural root medium must be at least four (4) feet in all cases, except where a natural rock formation occurs at shallower depths. In such case the operator shall create a root medium of equivalent thickness to its pre-mining condition.

4) The darkened surface soil shall be replaced as the final earth cover on high capability lands.

5) Location of texture compliance samples will be determined by random methods. Texture analysis shall be determined by methods specified by the Department.

b) The Department may alter the texture requirements under this Part only upon a clear and convincing showing that to vary such requirement would better effectuate the purposes of the Act than would enforcing the standards herein.

c) The affected land shall be graded to the approximate original contour of the land prior to mining. For the purpose of this Part, the slope classification of lands before mining are those lettered ranges developed by the U.S. Department of Agriculture, Soil Conservation Service for use in preparing a soil survey of the area.

d) Approximate original contour means grading of affected lands to a slope no greater than the maximum percent of the pre-mining slope range of the individual soil map units.

e)

1) The agricultural root medium described in Section 1825.14(a) shall be replaced and regraded to a uniform depth over the regraded spoil material in a manner that avoids excessive compaction or a compaction alleviation plan shall be provided. Excessive compaction is indicated by:

A) Very firm, massive soil physical condition in any layer above the rooting medium depth required by subsection (a)(3) that has one-half or more of the soil volume in masses ten (10) inches or more in diameter that are not exploited by the root system;

B) Roots restricted to a depth less than the required rooting meduim depth;

C) Confinement of roots to matrix desication cracks; or

D) Flattened roots.

2) Compaction alleviation is required unless the permittee can demonstrate that root system development at similar depths in undisturbed soils typical of the mined area is no better than that observed in the reconstructed soil. However, the requirements of 62 Ill. Adm. Code 1816.116 must still be met.

3) After approval of texture by the Department, the darkened surface soil shall be redistributed and graded to a uniform depth without excessive compaction over the replaced and regraded agricultural root medium.

f) High capability lands shall have a planned erosion control system if expected soil loss from row crop production will exceed the tolerable soil loss limits as defined by "Resource Conservation Planning Technical Material-IL-4" and subsequent revisions or modifications. Terrace systems, when utilized as part of a planned erosion control system, shall be constructed according to U.S. Department of Agriculture, Soil Conservation Service specifications. Erosion control plans in compliance with this subsection shall be submitted to and approved by the Department prior to the completion of the final grading of an areas, or on a time schedule approved by the Department after final grading based on seasonal factors, the extent of the area, and the sophistication of the erosion control plan.

g) Slopes of all affected lands shall be measured from the drainage divide to the base of the slope or to the intermittent water course at the lowest point. Abrupt slope changes between these points are not acceptable except for unusual conditions such as ditches, terraces, and roads.

h) The length of slope and contour of the restored surface shall be conducive to those farming operations normally associated with row crop production. Farming operations as used here shall include such measures or practices necessary to provide adequate drainage and erosion control for sustained row crop production.

(Source: Amended at 11 Ill. Reg. 8526, effective July 1, 1987)

Midland Coal Company

October 2, 1981

Mrs. Anna Johnson
R. R. #2
Wataga, IL 61488

Dear Mrs. Johnson:

In accordance with our telephone conversation today, enclosed are plat maps showing the land which we presently have for sale in Copley and Sparta townships.

Our asking price on the parcels north of route 167 are as follows:

#49 - $1,530/acre
#50 - $1,630/acre
#52 - $1,500/acre
#55 - $3,200/acre
#56 - $3,300/acre
#57 - $3,500/acre

If you have any further questions, please contact me at your convenience.

Very truly yours,

A. J. Schroff, Jr.
Business Manager

AJS/tw
Enc.
cc: R. F. Kropp

Midland Coal Company
1865 N. Henderson St.
Galesburg, Illinois 61401
(309) 344-3737

COPLEY TOWNSHIP LAND

Parcel #36 - 80 acres - 14 acres average quality tillable land, balance mined and reclaimed pasture and wooded area. Adequate water supply for cattle from creek running through property.

Parcel #49 - 80 acres in total, 26 of which are excellent quality tillable. Balance has been mined and reclaimed to good pasture.

Parcel #50 - 160 Acres.

Parcel #51 - 160 acres in total, 42 of which is good virgin tillable on the south end. Balance has been surfaced mined, reclaimed, and topsoil replaced. Large lake on property of approximately 16 acres.

Parcel #52 - 150 acres, all surface mined, reclaimed, and topsoil replaced. Currently in wheat. Large lake on property.

Parcel #61 - 178 acres - all tillable. 66% of farm is highest quality, and balance good quality.

Parcel #63A - 200 acres, all but 33 tillable. Quality ranges from excellent dark brown level soil to transitional, rolling soil. Pasture is basically heavy brush and timber.

Parcel #64 - 160 acres in total. 112 acres are tillable, with Tama, Ipama and some Clinton soils. Balance is heavily wooded, but both possible and practical to clear.

Parcel #66 - 40 acres which is all tillable and of top quality.

Parcel #67 - 40 acres in total - 28 acres of tillable land, 12 acres of picturesque pasture with creek. Livable residence, garage, and barn.

Parcel #68 - 160 acres total, 71 of which are tillable in varying qualities. 83 acres of rougher land, mined and unmined, with about 6 acres of water for recreation.

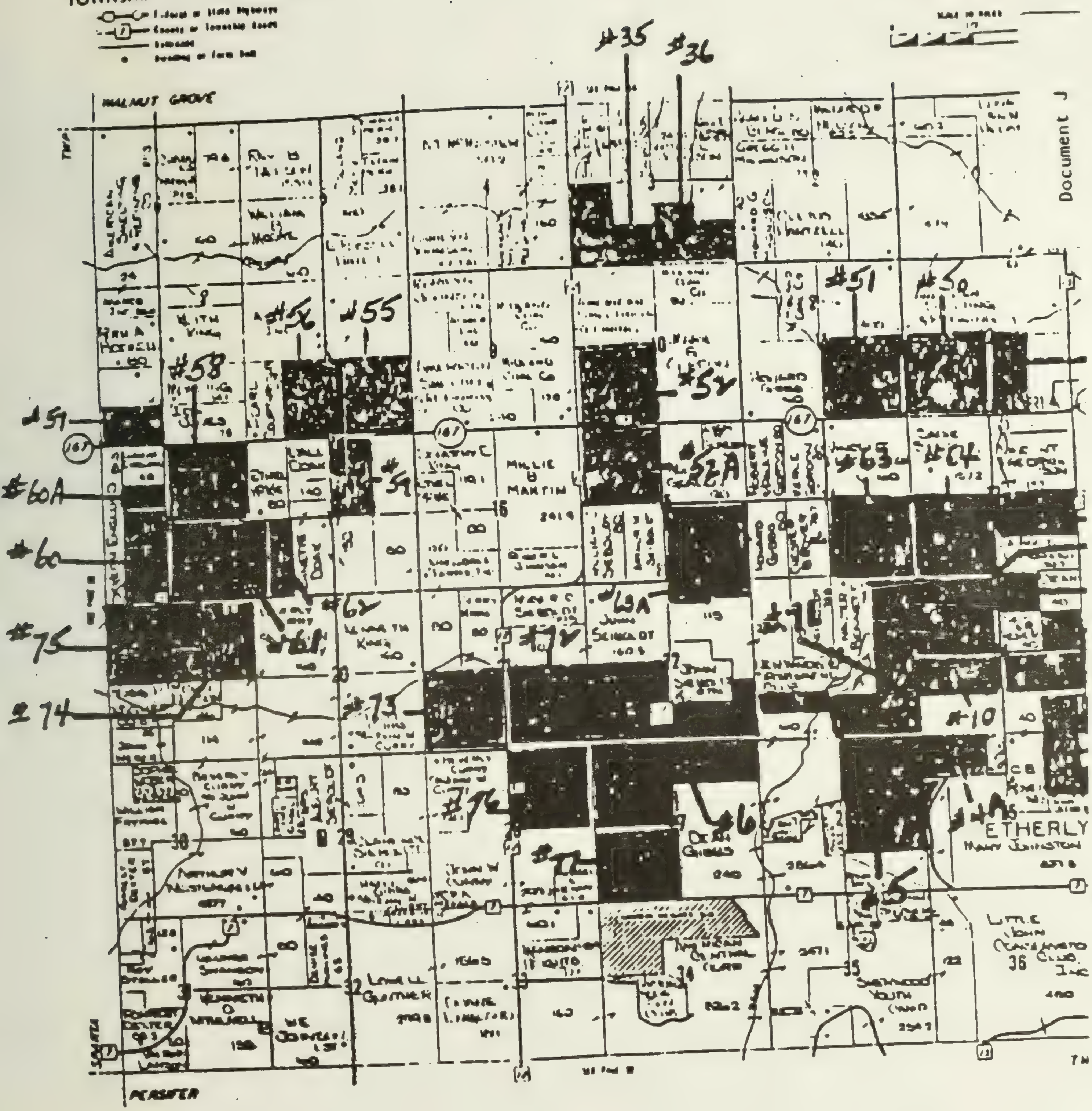
Parcel #70 - 80 acres total, 73 of which are tillable. A good quality, Older style house goes with the farm.

Parcel #71 - 306 acres total, of which 190 are mined and unreclaimed, but good pasture has been established. Ample water from small lakes. Balance of acreage is wooded in varying density.

(continued)

COPLEY

Document J



APPENDIX B

SELECTED DOMESTIC WATER WELL RECORDS

INSTRUCTIONS TO DRILLERS

White – Ill. Dept. of Public Health
Yellow Copy – Well Contractor
Blue Copy – Well Owner

FILL IN ALL PERTINENT INFORMATION REQUESTED AND MAIL ORIGINAL TO STATE DEPARTMENT OF PUBLIC HEALTH, CONSUMER HEALTH PROTECTION, 535 WEST JEFFERSON, SPRINGFIELD, ILLINOIS, 62761. DO NOT DETACH GEOLOGICAL/WATER SURVEYS SECTION. BE SURE TO PROVIDE PROPER WELL LOCATION.

ILLINOIS DEPARTMENT OF PUBLIC HEALTH
WELL CONSTRUCTION REPORT

1. Type of Well
   a. Dug ____. Bored X. Hole Diam. 32 in. Depth 55 ft.
      Curb material concret Buried Slab: Yes X No ____
   b. Driven ____. Drive Pipe Diam. ____ in. Depth ____ ft.
   c. Drilled ____. Finished in Drift ____. In Rock ____.
      Tubular ____. Gravel Packed ____.
   d. Grout:

(KIND)	FROM (Ft.)	TO (Ft.)

2. Distance to Nearest:
   Building 50 Ft.
   Cess Pool -
   Privy -
   Septic Tank 80
   Leaching Pit -
   Seepage Tile Field 90
   Sewer (non Cast iron) -
   Sewer (Cast iron) -
   Barnyard -
   Manure Pile -
3. Well furnishes water for human consumption? Yes X No ____
4. Date well completed 1/12/83
5. Permanent Pump Installed? Yes ____ Date ____ No X
   Manufacturer ____ Type ____ Location ____
   Capacity ____ gpm. Depth of Setting ____ Ft.
6. Well Top Sealed? Yes X No ____ Type vented cap
7. Pitless Adapter Installed? Yes X No ____
   Manufacturer Baker Model Number 1 BAM-5
   How attached to casing? clamp-on
8. Well Disinfected? Yes X No ____
9. Pump and Equipment Disinfected? Yes ____ No ____
10. Pressure Tank Size ____ gal. Type ____
    Location ____
11. Water Sample Submitted? Yes ____ No X

REMARKS:

Hardness 49 gpg

Fe 0.5 ppm

IDPH 4 065
1/74 – KNB-1
(80671 – 12 1,M Beta—6 74) 5

GEOLOGICAL AND WATER SURVEYS WELL RECORD

10. Property owner John Terrell Well No. ____
    Address 3325 N. Biltmore Peoria, Ill.
    Driller Steven Sauder License No. 92-622
11. Permit No. 105961 Date 1/5/83
12. Water from sand (Formation) 13. County Knox
    at depth 35 to 36 ft.
    Sec. 22.56
    Twp. 9N
    Rge. 4E
    Elev. ____
14. Screen: Diam. ____ in.
    Length: ____ ft. Slot ____

SHOW LOCATION IN SECTION PLAT
150's bcW
NE/4' SC SW

15. Casing and Liner Pipe

Diam. (In.)	Kind and Weight	From (Ft.)	To (Ft.)
5	PVC	+ 1½	16
24	Concrete	16	55

16. Size Hole below casing: ____ in.
17. Static level 26 ft. below casing top which is ____ ft. above ground level. Pumping level ____ ft. when pumping at ____ gpm for ____ hours. Flow 6 gpm.

18. FORMATIONS PASSED THROUGH	THICKNESS	DEPTH OF BOTTOM
fill	2	2
clay-yellow	22	24
clay-blue	11	35
sand-medium	1	36
clay-brown	4	40
shale-gray, soft	15	55

(CONTINUE ON SEPARATE SHEET IF NECESSARY)

SIGNED [illegible] DATE 1/12/83

Water sample being sent Jan. 4 - from Farm Bureau off. Sp

City Yates City County Knox

Section 15 Twp. No. 9N Range 4E

Location (in feet from section corner) Approx. 1020'E and 50'N of the SW cor.

Owner Cooper, Sadie MTS Authority

Tenant Claire Cooper

Contractor Bill Norton, Jr. Address Yates City, Ill.

Date drilled April, 1965 Elev. above sea level top of well 680'

Depth 465'

Log 345' top of Mississippi Limestone Pipe sealed in top of lime at 353 Bill Norton Jr. Well driller (may have log)

Were drill cuttings saved No (contact Norton) Where filed

Size hole 356' of 6" pipe 6" hole If reduced, where and how much

Casing record 356' new casing 19 lb. 6" id pipe all welded

Distance to water when not pumping 178' Distance to water is 178'

feet after pumping at 18 G. P. M. for 1 hours

Reference point for above measurements ground level

Type of pump submersible Distance to cylinder

Length of cylinder Length of suction pipe below cylinder

Length stroke Speed

Hours used per day Type of power

Rating of motor Rating of pump in G. P. M.

Can following be measured: (1) Static water level

(2) Pumping level (3) Discharge

(4) Influence on other wells

Temperature of water Was water sample collected

Date Effect of water on meters, hot water coils, etc.

Date of Analysis Analysis No. 168033

Recorder

White – Ill. ... of Public Health
Yellow Copy – Well Contractor
Blue Copy – Well Owner

INSTRUCTIONS TO DRILLERS

FILL IN ALL PERTINENT INFORMATION R... JESTED AND MAIL ORIGINAL TO STATE DEPARTMENT OF PUBLIC HEALTH, CONSUMER HEALTH PROTECTION, 535 WEST JEFFERSON, SPRINGFIELD, ILLINOIS, 62761. DO NOT DETACH GEOLOGICAL/WATER SURVEYS SECTION. BE SURE TO PROVIDE PROPER WELL LOCATION.

ILLINOIS DEPARTMENT OF PUBLIC HEALTH WELL CONSTRUCTION REPORT

1. Type of Well
   a. Dug ___ . Bored ___ . Hole Diam. ___ in. Depth ___ ft.
      Curb material ___ . Buried Slab: Yes ___ No ___
   b. Driven ___ . Drive Pipe Diam. ___ in. Depth X ft.
   c. Drilled X . Finished in Drift ___ . In Rock X .
      Tubular ___ . Gravel Packed ___ .
   d. Grout:

(KIND)	FROM (Ft.)	TO (Ft.)
Shale	0	53

2. Distance to Nearest:
   Building 45 Ft. — Seepage Tile Field 150
   Cess Pool — — Sewer (non Cast iron) ___
   Privy — — Sewer (Cast iron) —
   Septic Tank 100 — Barnyard —
   Leaching Pit — — Manure Pile —
3. Well furnishes water for human consumption? Yes X No ___
4. Date well completed Feb 15, 1980
5. Permanent Pump Installed? Yes ___ Date ___ No X
   Manufacturer ___ Type ___ Location ___
   Capacity ___ gpm. Depth of Setting ___ Ft.
6. Well Top Sealed? Yes X No ___ Type ___
7. Pitless Adapter Installed? Yes ___ No X
   Manufacturer ___ Model Number ___
   How attached to casing? ___
8. Well Disinfected? Yes X No ___
9. Pump and Equipment Disinfected? Yes ___ No ___
10. Pressure Tank Size ___ gal. Type ___
    Location ___
11. Water Sample Submitted? Yes ___ No X

REMARKS:

GEOLOGICAL AND WATER SURVEYS WELL RECORD

10. Property owner Louis Rogers Well No. ___
    Address Ortiz City, Ill.
    Driller J. C. Hopson License No. 102-139
11. Permit No. 79269 Date 2-13-80
12. Water from Limestone (Formation) 13. County Bond
    at depth 360 to 380 ft.
    Sec. 14 7a
    Twp. 9N
    Rge. 4E
    Elev. ___
14. Screen: Diam. ___ in.
    Length: — ft. Slot —

SHOW LOCATION IN SECTION PLAT
75' N, 920' E, SW/c

15. Casing and Liner Pipe

Diam. (in.)	Kind and Weight	From (Ft.)	To (Ft.)
8"	Steel 25.55	0	58
6"	P.V.C. .250	45	390

16. Size Hole below casing: 8 in.
17. Static level 200 ft. below casing top which is 1½ ft. above ground level. Pumping level 210 ft. when pumping at 30 gpm for 4 hours.

18. FORMATIONS PASSED THROUGH	THICKNESS	DEPTH OF BOTTOM
Yellow Clay	28	28
Sand, Silty & Gravel	53	81
Coal	3	84
Shale & Sandstone	242	326
Limestone	64	390

(CONTINUE ON SEPARATE SHEET IF NECESSARY)

SIGNED J. C. Hopson DATE Feb 25-80

IDPH 4.065

White – Ill. Dept. of Public Health
Yellow Copy – Well Contractor
Blue Copy – Well Owner

INSTRUCTIONS TO DRILLERS

FILL IN ALL PERTINENT INFORMATION REQUESTED AND MAIL ORIGINAL TO STATE DEPARTMENT OF PUBLIC HEALTH, CONSUMER HEALTH PROTECTION, 535 WEST JEFFERSON, SPRINGFIELD, ILLINOIS, 62761. DO NOT DETACH GEOLOGICAL/WATER SURVEYS SECTION. BE SURE TO PROVIDE PROPER WELL LOCATION.

ILLINOIS DEPARTMENT OF PUBLIC HEALTH WELL CONSTRUCTION REPORT

1. Type of Well
   a. Dug ____. Bored ____. Hole Dia ____ in. Depth ____ ft.
      Curb material ____. Buried Slab: Yes ____ No ____
   b. Driven ____. Drive Pipe Diam. ____ in. Depth ____ ft.
   c. Drilled ✓. Finished in Drift ____. In Rock ✓.
      Tubular ____. Gravel Packed ____.
   d. Grout:

(KIND)	FROM (Ft.)	TO (Ft.)

2. Distance to Nearest:
   Building 20 Ft. — Seepage Tile Field —
   Cess Pool — — Sewer (non Cast iron) —
   Privy — — Sewer (Cast iron) —
   Septic Tank — — Barnyard —
   Leaching Pit — — Manure Pile —
3. Well furnishes water for human consumption? Yes ____ No ✓
4. Date well completed Apr 26 – 79
5. Permanent Pump Installed? Yes ✓ Date Apr 30 No ____
   Manufacturer Aermotor Type Sub Location ____
   Capacity 12 gpm. Depth of Setting 400 Ft.
6. Well Top Sealed? Yes ✓ No ____ Type ____
7. Pitless Adapter Installed? Yes ✓ No ____
   Manufacturer Martenson Model Number ____
   How attached to casing? Gasket
8. Well Disinfected? Yes ____ No ✓
9. Pump and Equipment Disinfected? Yes ____ No ✓
10. Pressure Tank Size 30 gal. Type Seal air
    Location Well House
11. Water Sample Submitted? Yes ____ No ✓

REMARKS:

GEOLOGICAL AND WATER SURVEYS WELL RECORD

10. Property owner Fletch Pearson Well No. ____
    Address RR #1 – Farmington Ill.
    Driller Russell Blake License No. 102-126
11. Permit No. 84358 Date Apr 24-79
12. Water from Miss Lime (Formation) at depth 250 to 400 ft.
13. County Knox
    Sec. 19.26
    Twp. 9N
    Rge. 4E
    Elev. ____
14. Screen: Diam. ____ in.
    Length: ____ ft. Slot ____
15. Casing and Liner Pipe

Diam. (in.)	Kind and Weight	From (Ft.)	To (Ft.)
6	PVC	1	286

SHOW LOCATION IN SECTION PLAT
100'N 100'E SW/c NW SE SE

16. Size Hole below casing: 6 in.
17. Static level ____ ft. below casing top which is 1 ft. above ground level. Pumping level 400 ft. when pumping at 9 gpm for 1 hours.

18. FORMATIONS PASSED THROUGH	THICKNESS	DEPTH OF BOTTOM
Clay	30	30
Shale	250	280
Limestone	150	430

(CONTINUE ON SEPARATE SHEET IF NECESSARY)

SIGNED Russell Blake DATE Nov 15-79

IDPH 4.065
1/74 – KNB-1

White C[illegible] Ill. D[illegible] of Public Health
Yellow Copy – Well Contractor
Blue Copy – Well Owner

INSTRUCTIONS TO DRILLERS

FILL IN ALL PERTINENT INFORMATION REQUESTED AND MAIL ORIGINAL TO STATE DEPARTMENT OF PUBLIC HEALTH, CONSUMER HEALTH PROTECTION, 535 WEST JEFFERSON, SPRINGFIELD, ILLINOIS, 62761. DO NOT DETACH GEOLOGICAL/WATER SURVEYS SECTION. BE SURE TO PROVIDE PROPER WELL LOCATION.

ILLINOIS DEPARTMENT OF PUBLIC HEALTH
WELL CONSTRUCTION REPORT

1. Type of Well
   a. Dug ____. Bored ✓. Hole Diam. 43 In. Depth 68 ft.
      Curb material ____. Buried Slab: Yes ✓ No ____
   b. Driven ____. Drive Pipe Diam. ____ In. Depth ____ ft.
   c. Drilled ____. Finished in Drift ____. In Rock ____.
      Tubular ____. Gravel Packed ____.
   d. Grout:

(KIND)	FROM (Ft.)	TO (Ft.)

2. Distance to Nearest:
   Building 50 Ft. Seepage Tile Field ____
   Cess Pool ____ Sewer (non Cast Iron) ____
   Privy ____ Sewer (Cast Iron) ____
   Septic Tank 125 Barnyard ____
   Leaching Pit ____ Manure Pile ____
3. Well furnishes water for human consumption? Yes ✓ No ____
4. Date well completed 11/24/79
5. Permanent Pump Installed? Yes ____ Date ____ No ____
   Manufacturer ____ Type ____ Location ____
   Capacity ____ gpm. Depth of Setting ____ Ft.
6. Well Top Sealed? Yes ✓ No ____ Type ____
7. Pitless Adapter Installed? Yes ✓ No ____
   Manufacturer Baker Monitor Model Number Snappy
   How attached to casing? compression gasket
8. Well Disinfected? Yes ✓ No ____
9. Pump and Equipment Disinfected? Yes ____ No ____
10. Pressure Tank Size ____ gal. Type ____
    Location ____
11. Water Sample Submitted? Yes ____ No ____

REMARKS: Owner having pump contractor for #5, 9, + 10

GEOLOGICAL AND WATER SURVEYS WELL RECORD

10. Property owner Albert Threw Well No. 43
    Address R.R. Farmington
    Driller Edward L. Cosby License No. 102-16
11. Permit No. 40681 Date 10/18/79
12. Water from sand + brown sandy clay (Formation) 13. County Knox
    at depth 18 to 25 ft.
    Sec. 36,1[illegible]
    Twp. 9N
14. Screen: Diam. ____ In. Rge. 4E.
    Length: ____ ft. Slot ____ Elev. ____

SHOW LOCATION IN SECTION PLAT
NE NE SE

15. Casing and Liner Pipe

Diam. (In.)	Kind and Weight	From (Ft.)	To (Ft.)
6	PVC Schedule 40	2	10
36	Concrete	11	58
24	Concrete	57	68

16. Size Hole below casing: ____ In.
17. Static level 11 ft. below casing top which is 2 ft. above ground level. Pumping level 45 ft. when pumping at 10 gpm for 8 hours.

18. FORMATIONS PASSED THROUGH	THICKNESS	DEPTH OF BOTTOM
top soil	2	2
brown clay	15	17
brown sand	2	19
brown sandy clay	6	25
gray clay	35	60
dark shale	8	68

(CONTINUE ON SEPARATE SHEET IF NECESSARY)

SIGNED Edward L. Cosby DATE 1-3-80

IDPH 4.065
1/74 – KNB-1

White Copy – Ill Dept. Public Health
Yellow Copy – Well Contractor
Blue Copy – Well Owner

INSTRUCTIONS TO DRILLERS

FILL IN ALL PERTINENT INFORMATION REQUESTED AND MAIL ORIGINAL TO STATE DEPARTMENT OF PUBLIC HEALTH, ROOM 616, STATE OFFICE BUILDING, SPRINGFIELD, ILLINOIS, 62706. DO NOT DETACH GEOLOGICAL / WATER SURVEYS SECTION. BE SURE TO PROVIDE PROPER WELL LOCATION.

ILLINOIS DEPARTMENT OF PUBLIC HEALTH WELL CONSTRUCTION REPORT

1. Type of Well
   a. Dug ____ Bored ____ Hole Diam. ____ in. Depth ____ ft.
      Curb material ____ Buried Slab: Yes ____ No ____
   b. Driven ____ Drive Pipe Diam. ____ in. Depth ____ ft.
   c. Drilled X Finished in Drift X In Rock ____
      Tubular ____ Gravel Packed ____
   d. Grout:

(KIND)	FROM (Ft.)	TO (Ft.)
Drill Cuttings	0	20

2. Distance to Nearest:
   Building 20 Ft. Seepage Tile Field 80
   Cess Pool none Sewer (non Cast iron) ____
   Privy none Sewer (Cast iron) ____
   Septic Tank 60 Barnyard 1000'
   Leaching Pit none Manure Pile 1000'
3. Is water from this well to be used for human consumption?
   Yes X No ____
4. Date well completed January 23, 1973
5. Permanent Pump Installed? Yes X No ____
   Manufacturer Monitor Type Working Head
   Capacity 2½ gpm. Depth of setting 55' ft.
6. Well Top Sealed? Yes X No ____
7. Pitless Adaptor Installed? Yes X No ____
8. Well Disinfected? Yes X No ____
9. Water Sample Submitted? Yes ____ No ____

REMARKS:

IDPH 4.065
10/68

GEOLOGICAL AND WATER SURVEYS WELL RECORD

10. Property owner Harvey W. Caho Well No. 3
    Address 5914 North Elm Lane-Peoria 61614
    Driller W.S. Hofstetter License No. 92-8
11. Permit No. 21299 Date Dec. 19, 1972
12. Water from Sand (Formation) 13. County Knox
    at depth 60'4" to 65' ft.
    Sec. 32.1f
    Twp. 9N
    Rge. 4E
    Elev. ____
14. Screen: Diam. 4 in.
    Length: 2' ft. Slot .010
15. Casing and Liner Pipe

Diam (In.)	Kind and Weight	From (Ft.)	To (Ft.)
5"	Adapter	Plus 10"	4'
4"	11 Lb per Ft.	4'	63'

SHOW LOCATION IN SECTION PLAT

c'S 120' W
NE/c NE SW NW

16. Size Hole below casing: ____ in.
17. Static level 23'8" ft. below casing top which is 10" ft. above ground level. Pumping level 55 ft. when pumping at 2½ gpm for 4 hours.

18. FORMATIONS PASSED THROUGH	THICKNESS	DEPTH OF BOTTOM
Clay (yellow)	20	20
Clay (blue)	9	29
Sand (gray-fine-water)	2	31
Clay (blue)	29'4"	60'4"
Sand (gray-fine)	4'8"	65
On Shale		

(CONTINUE ON SEPARATE SHEET IF NECESSARY)

SIGNED Ralph W. Hofstetter DATE ____
Ralph W. Hofstettor
2108 North Sheridan Road

INSTRUCTIONS TO DRILLERS

White Copy — Ill. Dept. Public Health
Yellow Copy — Well Contractor
Blue Copy — Well Owner

FILL IN ALL PERTINENT INFORMATION REQUESTED AND MAIL ORIGINAL TO STATE DEPARTMENT OF PUBLIC HEALTH, ROOM 616, STATE OFFICE BUILDING, SPRINGFIELD, ILLINOIS 62706. DO NOT DETACH GEOLOGICAL/WATER SURVEYS SECTION. BE SURE TO PROVIDE PROPER WELL LOCATION.

ILLINOIS DEPARTMENT OF PUBLIC HEALTH
WELL CONSTRUCTION REPORT

1. Type of Well
   a. Dug ____. Bored ____. Hole Diam. 6 in. Depth 282 ft.
      Curb material ____. Buried Slab: Yes ____ No ____
   b. Driven X. Drive Pipe Diam. 8 in. Depth 70 ft.
   c. Drilled X. Finished in Drift ____. In Rock X.
      Tubular ____. Gravel Packed ____.
   d. Grout:

(KIND)	FROM (Ft.)	TO (Ft.)
Neat cement	5	244

2. Distance to Nearest:
   Building ____ Ft. Seepage Tile Field ____
   Cess Pool ____ Sewer (non Cast iron) ____
   Privy ____ Sewer (Cast iron) ____
   Septic Tank ____ Barnyard ____
   Leaching Pit ____ Manure Pile ____
3. Is water from this well to be used for human consumption?
   Yes X No ____
4. Date well completed March 8, 1971
5. Permanent Pump Installed? Yes X No ____
   Manufacturer Red JACKET Type Sub
   Capacity ____ gpm. Depth of setting 156 ft.
6. Well Top Sealed? Yes X No ____
7. Pitless Adaptor Installed? Yes X No ____
8. Well Disinfected? Yes X No ____
9. Water Sample Submitted? Yes ____ No X

REMARKS:
New home to be built later + much shal. Owner installed his pump I just used my Rig to lower pump.

IDPH 4.065
10/66

GEOLOGICAL AND WATER SURVEYS WELL RECORD

10. Property owner CLIFF McMULLEN Well No. 1
    Address RR LAURA ILL
    Driller NORTON License No. 92-206
11. Permit No. 11583 Date 12-8-70
12. Water from PENN SYSTEM (Formation) 13. County KNOX
    at depth 244 to 259 ft. Sec. 35 8h
14. Screen: Diam. 6 in. Twp. 10N
    Length: 15 ft. Slot 14" Rge. 4E
    Elev. 670

SHOW LOCATION IN SECTION PLAT

200'S 200'E of NW/c NW

15. Casing and Liner Pipe

Diam. (In.)	Kind and Weight	From (Ft.)	To (Ft.)
8"	28.55lb steel	-5	70
6"	19lb steel	+3	282

16. Size Hole below casing: 0 in.
17. Static level 50 ft. below casing top which is 3' ft. above ground level. Pumping level 150 ft. when pumping at 24 gpm for 2 hours.

18. FORMATIONS PASSED THROUGH	THICKNESS	DEPTH OF BOTTOM
Clay & rocky streaks	54	54
Shale gray	12	66
Slate Black	5	71
Coal	3	74
Shale dark gray to light gray	18	92
Limestone gray	2	94
Shale gray	6	100
Sandstone	4	104
Shale gray & Lime streaks	50	154

(CONTINUE ON SEPARATE SHEET IF NECESSARY) (Over)

SIGNED ____ DATE ____

B-7

White — Dept. of Public Health
Yellow Copy — Well Contractor
Blue Copy — Well Owner

INSTRUCTIONS TO DRILLERS

FILL IN ALL PERTINENT INFORMATION REQUESTED AND MAIL ORIGINAL TO STATE DEPARTMENT OF PUBLIC HEALTH, ROOM 616, STATE OFFICE BUILDING, SPRINGFIELD, ILLINOIS, 62706. DO NOT DETACH GEOLOGICAL / WATER SURVEYS SECTION. BE SURE TO PROVIDE PROPER WELL LOCATION.

ILLINOIS DEPARTMENT OF PUBLIC HEALTH WELL CONSTRUCTION REPORT

1. Type of Well
   a. Dug ____ Bored ____ Hole Diam. 6 in. Depth 386 ft.
      Curb material ____ Buried Slab: Yes ____ No ____
   b. Driven ____ Drive Pipe Diam. ____ in. Depth ____ ft.
   c. Drilled X Finished in Drift ____ In Rock X
      Tubular ____ Gravel Packed ____
   d. Grout:

(KIND)	FROM (Ft.)	TO (Ft.)
NBAT Cement	5	271

2. Distance to Nearest:
   Building 75 Ft. Seepage Tile Field ____
   Cess Pool ____ Sewer (non Cast iron) ____
   Privy ____ Sewer (Cast iron) 100
   Septic Tank 100 Barnyard 250
   Leaching Pit ____ Manure Pile ____
3. Is water from this well to be used for human consumption?
   Yes Y No ____
4. Date well completed June 9, 1971
5. Permanent Pump Installed? Yes X No ____
   Manufacturer Red Jacket Type Submersible
   Capacity 10 gpm. Depth of setting 252 ft.
6. Well Top Sealed? Yes X No ____
7. Pitless Adapter installed? Yes X No ____
8. Well Disinfected? Yes X No ____
9. Water Sample Submitted? Yes ____ No X

REMARKS:
[illegible]

IDPH 4.065
10/68

GEOLOGICAL AND WATER SURVEYS WELL RECORD

10. Property owner Peabody Coal Co. Well No. 2
    Address 301 N. Memorial Drive St. Louis, MO
    Driller Norton License No. 92-206
11. Permit No. 12618 Date May 13, 1971
12. Water from Miss. (Formation) at depth 270 to 384 ft.
13. County Knox
    Sec. 19.2h
    Twp. 9N
    Rge. 4E
    Elev. 665
14. Screen: Diam. ____ in.
    Length: ____ ft. Slot ____
15. Casing and Liner Pipe

Diam. (in.)	Kind and Weight	From (Ft.)	To (Ft.)
6	Steel 19 lb	5	271

SHOW LOCATION IN SECTION PLAT
150'S 1000'W
NE/c

16. Size Hole below casing: 6 in.
17. Static level 165 ft. below casing top which is 2 ft. above ground level. Pumping level 180 ft. when pumping at 12 gpm for 2 hours.

18. FORMATIONS PASSED THROUGH	THICKNESS	DEPTH OF BOTTOM
yellow clay	23	23
Penn System	247	270
Miss. Flint + Lime	114	384
Kinderhook Shale	2	386

(CONTINUE ON SEPARATE SHEET IF NECESSARY)

SIGNED [illegible] DATE [illegible]

White Co. Ill. Dept. of Public Health
Yellow Copy – Well Contractor
Blue Copy – Well Owner

INSTRUCTIONS TO DRILLERS

FILL IN ALL PERTINENT INFORMATION REQUESTED AND MAIL ORIGINAL TO STATE DEPARTMENT OF PUBLIC HEALTH, CONSUMER HEALTH PROTECTION, 535 WEST JEFFERSON, SPRINGFIELD, ILLINOIS, 62761. DO NOT DETACH GEOLOGICAL/WATER SURVEYS SECTION. BE SURE TO PROVIDE PROPER WELL LOCATION.

ILLINOIS DEPARTMENT OF PUBLIC HEALTH WELL CONSTRUCTION REPORT

1. Type of Well
   a. Dug ____. Bored ✓. Hole Diam. ~~4 Ft~~ 30 in. Depth 35 ft.
      Curb material ____. Buried Slab: Yes ✓ No ____
   b. Driven ____. Drive Pipe Diam. ____ in. Depth ____ ft.
   c. Drilled ____. Finished in Drift ____. In Rock ____.
      Tubular ____. Gravel Packed ____.
   d. Grout:

(KIND)	FROM (Ft.)	TO (Ft.)

2. Distance to Nearest:
   Building 50 Ft. Seepage Tile Field ____
   Cess Pool ____ Sewer (non Cast iron) ____
   Privy ____ Sewer (Cast iron) ____
   Septic Tank 75 Barnyard ____
   Leaching Pit ____ Manure Pile ____
3. Well furnishes water for human consumption? Yes ✓ No ____
4. Date well completed 4-27-79
5. Permanent Pump Installed? Yes ____ Date ____ No ____
   Manufacturer ____ Type ____ Location ____
   Capacity ____ gpm. Depth of Setting ____ Ft.
6. Well Top Sealed? Yes ✓ No ____ Type ____
7. Pitless Adapter Installed? Yes ✓ No ____
   Manufacturer Baker Monitor Model Number Snappy
   How attached to casing? Compression Gasket
8. Well Disinfected? Yes ✓ No ____
9. Pump and Equipment Disinfected? Yes ____ No ____
10. Pressure Tank Size ____ gal. Type ____
    Location ____
11. Water Sample Submitted? Yes ✓ No ____

REMARKS:

Owner had pump contractor
for 5, 9 + 10.

IDPH 4 065
1/74 – KNB-1

GEOLOGICAL AND WATER SURVEYS WELL RECORD

10. Property owner W.R. GRACE + Co. Well No. 9
    Address RR YATES City IL.
    Driller Edward L. Cosky License No. 102-16
11. Permit No. 83897 Date 3-13-79
12. Water from Brown Sandy Clay (Formation) 13. County Knox
    at depth 12 to 20 ft. Sec. 72h
14. Screen: Diam. ____ in. Twp. 9N
    Length: ____ ft. Slot ____ Rge. 4E
    Elev. ____

SHOW LOCATION IN SECTION PLAT
NW NE NE

15. Casing and Liner Pipe

Diam. (In.)	Kind and Weight	From (Ft.)	To (Ft.)
6	PVC Schedule 40	+2	10
24	Concrete	11	30

16. Size Hole below casing: ____ in.
17. Static level 10 ft. below casing top which is 2 ft. above ground level. Pumping level ____ ft. when pumping at ____ gpm for ____ hours.

18.

FORMATIONS PASSED THROUGH	THICKNESS	DEPTH OF BOTTOM
Brown Clay	12	12
Brown Sandy Clay	8	20
Gray Clay	5	25
Gray Shale	9	34
Rock	1	35

(CONTINUE ON SEPARATE SHEET IF NECESSARY)

SIGNED [illegible] DATE [illegible]

APPENDIX C

MUNICIPAL WATER WELL RECORDS

Pump had been operating 4 hours when this sample was collected

#1

Min + F

City FARMINGTON County Fulton

Section 1 Twp. No. T.8 N. Range 4 E.

Location (in feet from section corner) Approx. 100 ft. N. and 1320 ft. W. of the S.E. corner of Section 1, T.8 N., R.4 E.

Owner Farmington Authority Mr. F. Eakman, W.W.Supt.

Contractor C.P.Prandt. Address Chicago, Illinois

Date drilled March 1913 Elev. above sea level top of well 788 ft.

Depth 1710 feet deep.

Log

Pleistocene............. 0 to 20 ft.
Pleistocene & Pennsyl. 20 to 40 ft.
Pennsylvanian.......... 40 to 470 ft.
Mississippian.........470 to 870 ft.
Silurian..............870 to 1075 ft.
Galena-Platteville..1075 to 1515
St. Peter..........1515 to 1700

Were drill cuttings saved Yes Where filed S.G.S.

Size hole 10-inch If reduced, where and how much

Casing record 10-inch steel pipe from surface to 1020 feet
8-inch iron pipe from 1020 to 1260 feet.

Distance to water when not pumping 268 ft Distance to water is Not known
There is no air line and the draw down is not known.
feet after pumping at G. P. M. for hours.

Reference point for above measurements below ground surface.

Type of pump Pomona turbine Distance to cylinder ~~250~~ 340 ft.

Length of cylinder 8 ft. Length of suction pipe below cylinder ~~20~~ 10 ft.

Length stroke Speed 1760 rpm.

Hours used per day 10 to 12 Type of power Westinghouse electric

Rating of motor 25 hp. Rating of pump in G. P. M. 150

Can following be measured: (1) Static water level No.

(2) Pumping level No. (3) Discharge No.

(4) Influence on other wells ?

Temperature of water 62° F. Was water sample collected Yes

Date January 27, 1918 Effect of water on meters, hot water coils, etc.

Date of Analysis Analysis No. 113288

Please send copy of analysis of sample to
Mr. F. Eakman, W.W. Supt.

Recorder E.G.Jones, Field Engineer S.W.S.

3807-22617 12 C-1 Date

(37329—20M—5-56) 2

Page 1

ILLINOIS GEOLOGICAL SURVEY, URBANA

Strata	Thickness	Top	Bottom
Black soil and yellow clay	4	0	4
Yellow clay	7	4	11
Gray lime	29	11	40
Gray lime and black shale	4	40	44
Gray shale	71	44	115
Cray shale, lime and coal	9	115	124
Gray shale	47	124	171
Dark gray shale	6	171	177
Coal	3	177	180
Dark gray shale	14	180	194
Green gray shale	16	194	210
Gray shale	32	210	242
Dark gray shale	56	242	298
Gray shale	7	298	305
Gray sandstone	5	305	310
Tan shale	7	310	317
Cray lime	3	317	320
Gray shale	18	320	338
Gray and blue shale	11	338	349
Dark gray shale and sandstone	6	349	355
Cray sandstone and shale	3	355	358
Sandstone	12	358	370
Sandstone and shale	3	370	373
Sandy shale	4	373	377
Cray blue sandy shale	18	377	395
Sand and shale	3	395	398
White sand	5	398	403
Cray lime	1	403	404
Sandy shale	5	404	409
Sandstone	10	409	419
Cray shale	6	419	425
Hard sandstone	2	425	427
Lime and sand	6	427	433

COMPANY Varner Well and Pump Co.

FARM City of Farmington NO. 2

DATE DRILLED November 1956 COUNTY NO. 948

AUTHORITY Varner Well and Pump Co.

ELEVATION 501 N 1280 W

LOCATION 800' N line, 300' E line of section

COUNTY FULTON 1.2a 11-8N-4E

(37329—20M—5-56)

Strata	Thickness	Top	Bottom
Sandstone	2	433	435
Sandstone and shale	7	435	442
Sandstone and lime	2	442	444
Gray and tan sand	2	444	446
Gray sandstone	4	446	450
Shale and sandstone	2	450	452
Sandy shale	5	452	457
Blue gray shale	4	457	461
Shale, lime, rock	3	461	464
Rock	2	464	466
Gray lime	4	466	470
Gray shale	8	470	478
Gray lime and flint	3	478	481
Gray lime	34	481	515
Gray lime	1	515	516
Gray lime	7	516	523
Dark gray lime	7	523	530
Limestone	3	530	533
Gray lime	96	533	629
Green shale	110	629	739
Green and brown shale	18	739	757
Brown shale	83	757	840
Gray shale	26	840	866
Gray lime	30	866	896
Limestone	3	896	899
Lime and shale	4	899	903
Gray lime	202	903	1105
Brown gray shale	18	1105	1123
Light green shale	21	1123	1144
Green gray shale	22	1144	1166
Gray lime	10	1166	1176
Gray lime and shale	7	1176	1183
Gray shale	87	1183	1270
Gray lime	10	1270	1280
Gray brown lime	49	1280	1329
Dark gray lime	30	1329	1359
Gray brown lime	37	1359	1396
Gray lime	30	1396	1426
Gray, brown lime	42	1426	1468

Varner Well & Pump Co. City of Farmington

COUNTY FULTON 1- 11-8N-4E

(37329—20M—5-56)

Strata	Thickness	Top	Bottom
Gray lime	55	1468	1523
Gray brown lime	18	1523	1541
Gray lime	24	1541	1565
Gray lime and sandstone	7	1565	1572
Fine white sandstone	30	1572	1602
Gray sandstone	6	1602	1608
Sandstone, hard	42	1608	1650
Gray sandstone	5	1650	1655
Bluish gray sandstone	88	1655	1743

Casing record: 20' of 25" pipe with shoe from surface to 20'; 264' of 20" liner with shoes top and bottom from 96' to 360'; 877' of 12" casing, cement grouted, from +1' to 876'; 213' of 10" liner with shoes from 1067' to 1280'.

Diameters: 25 1/4" surface to 20'; 23" from 20' to 360'; 17" from 360' to 878'; 12" from 878' to 1280'; 10" from 1280' to 1743'.

Static Water Levels:

From	To	Levels
Surface	125'	None recorded
125'	194'	85'
194'	210'	123'
210'	395'	143'
395'	403'	218'
403'	415'	300'
415'	417'	322'
417'	435'	312'
435'	516'	300'
516'	573'	330'
573'	685'	315'
685'	701'	285'
701'	707'	315'
707'	720'	285'

COUNTY Varner Well & Pump Co. City of Farmington
FULTON 1- ~~11~~-8N-4E

(37329—20M—5-56)

Strata

From	To	Levels
720'	753'	315'
753'	834'	285'
834'	939'	280'
939'	1017'	285'
1017'	1037'	280'
1037'	1365'	285'
1365'	1743'	295'

#2
Varner Well & Pump Co. City of Farmington
COUNTY FULTON ~~11~~-8N-4E

no permit

#1

City east of Yates City County Knox

Section 12 Twp. No. 9 N. Range 4E.

Location (in feet from section corner) 200' W. & 2600' S. of N.E. corner

Owner Yates City Well #1 Authority

Contractor C. W. Varner Address Dubuque, Iowa

Date drilled Aug., 1940 Elev. above sea level top of well

Depth 94'

Log 56' dirt, clay, "shale"; 4' shale, rock, sand & fine gravel; 2' yellow clay & sand; 13' coarse sand & yellow clay; 2' hard coarse sand; 9' coarse sand; 8' shale

Were drill cuttings saved Where filed

Size hole If reduced, where and how much

Casing record 8" to 76'2"; screen 74'-94', top 2' #24 slot; next 5' #44, next 10' #34, next 3' #70

Distance to water when not pumping Distance to water is

fe after pumping at G. P. M. for hours.

Reference point for above measurements

Type of pump Distance to cylinder

Length of cylinder Length of suction pipe below cylinder

Length stroke Speed

Hours used per day Type of power

Rating of motor Rating of pump in G. P. M.

Can following be measured: (1) Static water level

(2) Pumping level (3) Discharge

(4) Influence on other wells

Temperature of water Was water sample collected

Date Effect of water on meters, hot water coils, etc.

Date of Analysis Analysis No.

Recorder

Date 10/9/40

White Copy – Ill Dept of P   Health
Yellow Copy – Well Contractor
Blue Copy – Well Owner

INSTRUCTIONS TO DRILLERS

FILL IN ALL PERTINENT INFORMATION REQUESTE   ND MAIL ORIGINAL TO STATE DEPARTMENT OF PUBLIC HEALTH, ROOM 616, STATE OFFICE BUILDING, SPRINGFIELD, ILLINOIS, 62706. DO NOT DETACH GEOLOGICAL WATER SURVEYS SECTION. BE SURE TO PROVIDE PROPER WELL LOCATION

mineral

1 67

21943

ILLINOIS DEPARTMENT OF PUBLIC HEALTH
WELL CONSTRUCTION REPORT

1. Type of Well
   - a. Dug ____ Bored ____ Hole Diam. ____ in. Depth 1580 ft.
     Curb material ____ Buried Slab: Yes ____ No ____
   - b. Driven ____ Drive Pipe Diam. ____ in. Depth ____ ft.
   - c. Drilled ✓ Finished in Drift ____ In Rock ____
     Tubular ____ Gravel Packed ____
   - d. Grout:

(KIND)	FROM (Ft.)	TO (Ft.)

2. Distance to Nearest:
   Building ____ Ft. Seepage Tile Field ____
   Cess Pool ____ Sewer (non Cast iron) ____
   Privy ____ Sewer (Cast iron) ____
   Septic Tank ____ Barnyard ____
   Leaching Pit ____ Manure Pile ____
3. Is water from this well to be used for human consumption?
   Yes ____ No ____
4. Date well completed [illegible]
5. Permanent Pump Installed? Yes X No ____
   Manufacturer [illegible] Type Submersible [illegible] at 200 gpm
   Capacity ____ gpm. Depth of setting ____ ft.
6. Well Top Sealed? Yes ____ No ____
7. Pitless Adaptor Installed? Yes ____ No ____
8. Well Disinfected? Yes ____ No ____
9. Water Sample Submitted? Yes ____ No ____

[illegible] electric [illegible]

REMARKS: Pump Model No. = 5F2-400H
[illegible] No. = [illegible]

collected 8-30-79
3:25 PM
76°F

C-7

[illegible]

GEOLOGICAL WATER SURVEYS WATER WELL RECORD

10. Dept. Mines and Minerals permit No. ____ Year ____
11. Property owner [illegible] Well No. [illegible]
    Address ____
    Driller [illegible] License No. ____
12. Water from ____ (Formation) 13. County [illegible]
    at depth ____ to ____ ft.
14. Screen: Diam. ____ in.
    Length: ____ ft. Slot ____
    Sec. [illegible] Twp. [illegible] Rng. [illegible] Elev. [illegible]

SHOW LOCATION IN SECTION PLAT

15. Casing and Liner Pipe

Diam. (in.)	Kind and Weight	From (Ft.)	To (Ft.)
[illegible]		0	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

16. Size Hole below casing: ____ in.
17. Static level [illegible] ft. below casing top which is ____ ft. above ground level. Pumping level [illegible] ft. when pumping at [illegible] gpm for [illegible] hours.

18. FORMATIONS PASSED THROUGH	THICKNESS	DEPTH OF BOTTOM
Drift	[illegible]	62
Shale	250	310
Limestone	[illegible]	[illegible]
Shale	[illegible]	[illegible]
Limestone	[illegible]	[illegible]
Shale	80	[illegible]
Limestone	345	[illegible]
Sandstone	[illegible]	1575
Shale	5	1580
(CONTINUE ON SEPARATE SHEET IF NECESSARY)		

SIGNED ____ DATE ____

[illegible]

A

Sample D.1. Collected after pump had been operating 1 minute. Idle period prior to starting the pump was 4 hours.

City Elmwood County Peoria

Section 8 Twp. No. 9 N. Range 5 E.

Location (in feet from section corner) 200 ft. North and 450 ft. East of the southwest corner of Sec.8, T 9 N., R.5 E.

Owner Elmwood Authority Mr Harry Archibald, Marshall Mr.C.Jackson Reed, W.W.Supt.

Contractor ? Address

Date drilled 1896 Elev. above sea level top of well 625 ± ft.

Depth 1498

Log None available

Were drill cuttings saved Where filed

Size hole If reduced, where and how much

Casing record 10-inch casing 0 to 100 ft.
8-inch casing from 100 to 447
6-inch casing from 447 to 1157

Distance to water when not pumping 100 ft estimated Distance to water is 120 ft.est.

feet after pumping at 90 gpm G. P. M. for hours.

Reference point for above measurements ground surface same as top of pump

Type of pump Air-lift Distance to cylinder 342 ft

Length of cylinder Length of suction pipe below cylinder

Length stroke Speed

Hours used per day Type of power Ingersoll-Rand Compressor Westinghouse electric motor.

Rating of motor 25 hp Rating of pump in G. P. M. Pump delivered 95 gpm, by measurements in reservoir. Now estimated at 90 GPM.

Can following be measured: (1) Static water level No

(2) Pumping level No (3) Discharge No

(4) Influence on other wells

Temperature of water 64.5 ° F. Was water sample collected yes. This is one of a series of 8 samples

Date May 24, 1947 Effect of water on meters, hot water coils, etc.

Date of Analysis Analysis No. 110405

Please send copy of results of test to Mr.C.Jackson Reed W.W.Supt.

Recorder

2807-22617 12 E.G.Jones Engineer S.W.S. Date

C-8

XV

LOG OF WATER WELL

Property owner City of Elmwood Well No. [illegible]

Drilled by Peerless Service Company Year 1947

Formations passed through	Thick-ness	Depth of Bottom
Black Soil	0	5
Yellow Clay	10	15
Blue Clay	12	27
Gravel and Clay	4	31
Gravel and Sand	16	47
Clay	3	50

[Continue on back if necessary]

Finished in ______ at ______ to ______

Cased with 10 inch casing from 0 to 39

and ______ inch ______ from ______ to ______

Size hole below casing 100 inch. Static level from surf. ______

Tested capacity ______ gal. per min. Temperature ______

Water lowered to 8 ft. ______ in. in ______ hrs. ______ min.

Length of test ______ hrs. ______ min. Screen ______

Slot ______ Diam. ______ Length ______ Bottom set at ______

S.S. ~~[illegible]~~ 17743
L73a6

[Show location in Section Plat]

Township name ______ Elev. ______ Sec. 7

~~Ap 1240' S line, [illegible] w. line of section~~

Description of location Section 7 Twp. 9N

Township 9N, Range 5E Rge. 5E

Signed Peerless Service Co. County Peoria

Copy for Illinois State Water Survey Index: ______

(23844—50M—9-55)

ILLINOIS GEOLOGICAL SURVEY, URBANA

Page 1

Strata	Thickness	Top	Bottom
Pleistocene Series			
No samples	21		21
Gravel to ½", clean	3		24
No samples	51		75
Gravel to ½", clayey, gray; little till, silty, gray	20		95
Pennsylvanian System			
Shale, dark gray, black, grayish brown; limestone, yellowish brown to green, fine(105-125)	290		385
Mississippian System			
Burlington Formation			
Chert, weak, dense	20		405
Limestone, cherty, light yellow gray, fine to coarse	40		445
Kinderhook Formation			
Shale, grayish green to grayish brown, firm to weak (no samples from 680'-690')	245		690
Dolomite, yellowish gray to yellowish brown, fine to coarse	25		715
~~Devonian Syst~~			
Devonian System			
Cedar Valley-Wapsipinicon Formation			
Limestone, yellowish gray, fine	35		750
Silurian System			
Niagaran-Alexandrian Series			
Dolomite, light yellowish gray, fine to coarse; shale, grayish brown to brown, weak to firm at base	258		1008
Edgewood Formation			
Dolomite, pale yellowish brown, fine to coarse	12		1020

COMPANY Layne-Western Co. NO.

FARM Village of Elmwood #6 COUNTY NO.

DATE DRILLED 1951

AUTHORITY (L.S.)

ELEVATION 640' est. T.M.

LOCATION 730' E. line, 470' N. line, SW

S.S. #21073

COUNTY PEORIA

7-9N-5E

Page ILLINOIS GEOLOGICAL SURVEY, URBANA

Strata	Thickness	Top	Bottom
Ordovician System			
Maquoketa Formation			
Dolomite, dark brown, fine to medium; shale, dark brown, firm to weak	95		1115
Galena ~~Glenwood~~-Platteville Formation			
Dolomite, pale grayish brown, fine to coarse	315		1430
Glenwood-St. Peter Formation			
Sandstone, light gray, fine to coarse, incoherent	132		1562
Shakopee Formation			
Sandstone, white, fine to coarse, incoherent; dolomite, light yellowish gray to green, very fine	10		1572
1 of Well No 3			

Summary sample study log furnished by the State Geological Survey

Layne-Western Co. Village of Elmwood #6

COUNTY PEORIA S.S. #21073 7-9N-5E

APPENDIX D

GROUND-WATER PUBLICATIONS

GROUND-WATER PUBLICATIONS

Knox County

*1962	RI-43	Yields of deep sandstone wells in northern Illinois. Walton-Csallany.
*1963	RI-46	Yields of shallow dolomite wells in northern Illinois. Csallany-Walton.
*1978	CR-199	Reconnaissance study of final cut impoundments. Gibb-Evans.
*1982	C-154	Water level trends, pumpage, and chemical quality in the Cambrian-Ordovician aquifer in Illinois, 1971-1980. Sasman-Benson-Ludwigs-Williams.
1985	COOP-10	Geology, hydrology, and water quality of the Cambrian and Ordovician Systems in northern Illinois. Visocky-Sherrill-Cartwright.
*1987	B-60-34	Public ground-water supplies in Knox County. Woller-Sanderson-Sargent-Olson.
1989	CR-473	Regional assessment of northern Illinois ground-water resources. Nealon-Kirk-Visocky.

Peoria County

*1940	B-33	Water resources in Peoria-Pekin district.
*1949	RI-5	Infiltration of soils in the Peoria area. Stauffer.
*1950	B-39	Groundwater in the Peoria region. Horberg-Suter-Larson.
*1956	C-54	High-rate recharge of ground water by infiltration. Suter.
*1960	B-48	Artificial ground-water recharge at Peoria, Illinois. Suter-Harmeson.
*1962	RI-43	Yields of deep sandstone wells in northern Illinois. Walton-Csallany.
*1963	RI-46	Yields of shallow dolomite wells in northern Illinois. Csallany-Walton.
*1965	COOP-3	Preliminary report on the ground-water resources of the Havana region in west-central Illinois. Walker-Bergstrom-Walton.
1968	RI-60	Coarse filter media for artificial recharge. Thomas.
1969	RI-61	Groundwater levels and pumpage in the Peoria-Pekin area, Illinois 1890-1966. Marino-Schicht.
*1970	RS-162	Salt Piling - a source of water supply pollution. Walker.
*1978	CR-199	Reconnaissance study of final cut impoundments. Gibb-Evans.

1979	CR-208	Groundwater conditions and river-aquifer relationships along the Illinois Waterway. Gibb-Noel-Bogner-Schicht.
*1982	C-154	Water level trends, pumpage, and chemical quality in the Cambrian-Ordovician aquifer in Illinois, 1971-1980. Sasman-Benson-Ludwigs-Williams.
1985	COOP-10	Geology, hydrology, and water quality of the Cambrian and Ordovician Systems in northern Illinois. Visocky-Sherrill-Cartwright.
1989	CR-473	Regional assessment of northern Illinois ground-water resources. Nealon-Kirk-Visocky.

Fulton

*1950	B-39	Groundwater in the Peoria region. Horberg-Suter-Larson.
*1962	RI-43	Yields of deep sandstone wells in northern Illinois. Walton-Csallany.
*1963	RI-46	Yields of shallow dolomite wells in northern Illinois. Csallany-Walton.
*1965	COOP-3	Preliminary report on the ground-water resources of the Havana region in west-central Illinois. Walker-Bergstrom-Walton.
*1966	RI-55	Yields of wells in Pennsylvanian and Mississippian rocks in Illinois. Csallany.
*1978	CR-199	Reconnaissance study of final cut impoundments. Gibb-Evans.
1979	CR-208	Groundwater conditions and river-aquifer relationships along the Illinois Waterway. Gibb-Noel-Bogner-Schicht.
*1980	CR-237	Assessment of eighteen public groundwater supplies in Illinois. Wehrmann-Visocky-Burris-Ringler-Brower.
*1982	C-154	Water level trends, pumpage, and chemical quality in the Cambrian-Ordovician aquifer in Illinois, 1971-1980. Sasman-Benson-Ludwigs-Williams.
1985	COOP-10	Geology, hydrology, and water quality of the Cambrian and Ordovician Systems in Northern Illinois. Visocky-Sherrill-Cartwright.
1989	CR-473	Regional assessment of northern Illinois ground-water resources. Nealon-Kirk-Visocky.

APPENDIX E

SOILS DATA

Table 1. Soils Occuring in the Petition Site and Buffer Area, Including Quantities and Taxonomy

Soil Name	Mapping Units in Study Area	Hectares within Petition	% Petition	% Buffer	% Knox Co.
Alvin sandy loam, 8-15% slopes	131D	1.57	0.06	0.02	0.3
Assumption silt loam, 5-10% slopes, eroded; 10-15% slopes, eroded; 10-15% slopes, severely eroded	259C2, 259D2, 259D3	68.36	2.62	1.50	1.6
Atlas silty clay loam, 10-18% slopes, severely eroded	7D3	3.85	0.15	0.10	0.3
Camden silt loam, 5-10% slopes, eroded	134C2	0.95	0.04	0.01	0.3
Clarksdale silt loam	257	10.15	0.39	1.05	2.7
Coatsburg silty clay loam, 5-12% slopes, eroded	660C2	1.11	0.04	0.03	0.1
Denny silt loam	45	2.87	0.11	0.05	0.2
Dorchester silt loam[a]	239	----	----	0.29	0.5
Downs silt loam, 2-6% slopes	386B	49.77	1.91	1.91	2.9
Elco silt loam, 8-15% slopes, eroded; 15-20% slopes; 15-20% slopes, eroded	119D2, 119E[b], 119E2	74.78	2.87	2.26	3.0
Elkhart silty clay loam, 3-5% slopes, eroded; 5-10% slopes, eroded; 8-15% slopes, severely eroded	567B2, 567C2, 567D3[b]	52.28	2.01	2.14	1.5
Fayette silt loam, 1-5% slopes, 5-10% slopes, eroded; 10-15% slopes, eroded	280B[b], 280C2[b], 280D2	2.57	0.10	0.51	3.1
Hickory silt loam, 8-15% slopes; 10-15% slopes, eroded; 15-30% slopes; 15-30% slopes, eroded; 30-50% slopes	8D, 8D2, 8E[b], 8E2, 8G	63.67	2.44	3.74	7.8
Huntsdale silt loam	77	1.07	0.04	0.01	1.1

See footnotes at end of table

Table 1. Soils Occuring in the Petition Site and Buffer Area, Including Quantities and Taxonomy (cont.)

Soil Name	Family or higher taxonomic class
Alvin sandy loam, 8-15% slopes	Coarse-loamy, mixed, mesic Typic Hapludalfs
Assumption silt loam, 5-10% slopes, eroded; 10-15% slopes, eroded; 10-15% slopes, severely eroded	Fine-silty, mixed, mesic Typic Argiudolls
Atlas silty clay loam, 10-18% slopes, severely eroded	Fine, montmorillonitic, mesic, sloping Aeric Ochraqualfs
Camden silt loam, 5-10% slopes, eroded	Fine-silty, mixed, mesic Typic Hapludalfs
Clarksdale silt loam	Fine, montmorilonitic, mesic Udollic Ochraqualfs
Coatsburg silty clay loam, 5-12% slopes, eroded	Fine, montmorillonitic, mesic, sloping Typic Argiaquolls
Denny silt loam	Fine, montmorilonitic, mesic, Mollic Albaqualfs
Dorchester silt loam[a]	Fine-silty, mixed (calcareous), mesic Typic Udifluvents
Downs silt loam, 2-6% slopes	Fine-silty, mixed, mesic Mollic Hapudalfs
Elco silt loam, 8-15% slopes, eroded; 15-20% slopes; 15-20% slopes, eroded	Fine-silty, mixed, mesic Typic Hapudalfs
Elkhart silty clay loam, 3-5% slopes, eroded; 5-10% slopes, eroded; 8-15% slopes, severely eroded	Fine-silty, mixed, mesic Typic Argiudolls
Fayette silt loam, 1-5% slopes, 5-10% slopes, eroded; 10-15% slopes, eroded	Fine-silty, mesic Typic Hapludalfs
Hickory silt loam, 8-15% slopes; 10-15% slopes, eroded; 15-30% slopes; 15-30% slopes, eroded; 30-50% slopes	Fine-loamy, mixed, mesic Typic Hapludalfs
Huntsdale silt loam	Fine-silty, mixed, mesic Cumulic Hapludolls

See footnote at end of table

Table 1. Soils Occuring in the Petition Site and Buffer Area, Including Quantities and Taxonomy

Soil Name	Mapping Units in Study Area	Hectares within Petition	% Petition	% Buffer	% Knox Co.
Ipava silt loam; 0-3% slopes	43[b], 43A	323.44	12.39	12.23	16.9
Jules silt loam[a]	28	----	----	0.10	----
Keomah silt loam	17	2.32	0.09	0.36	1.2
Lawson silt loam	451	21.96	0.84	2.85	0.4
Lenzburg silty clay loam, 1-7% slopes; silt loam, 10-20% slopes; loam, 20-70% slopes	871B, 871D, 871G	573.92	21.99	26.61	4.1
Littleton silt loam, 1-3% slopes	81B	5.41	0.21	0.07	0.3
Marseilles silt loam, 10-15% slopes, eroded	549D2	0.74	0.03	0.01	2.9
Orion silt loam	415	3.03	0.12	0.07	3.4
Orthents, silty, gently sloping	801B	0.69	0.03	0.01	0.2
Paxico silt loam, frequently flooded, brief duration[a]	406	----	----	0.21	----
Radford silt loam	74	65.36	2.50	1.21	1.0
Rapatee silty clay loam, 1-7% slopes; 5-12% slopes	872B, 872C[b]	1.44	0.06	4.14	0.3
Rozetta silt loam, 1-5% slopes; 5-10% slopes, eroded	279B, 279C2	66.41	2.54	5.39	11.1
Sable silty clay loam	68	56.96	2.18	1.47	1.1
Sawmill silty clay loam; overwash	107[b], 107+	8.45	0.32	0.54	1.3

See footnotes at end of table

Table 1. Soils Occuring in the Petition Site and Buffer Area, Including Quantities and Taxonomy (cont.)

Soil Name	Family or higher taxonomic class
Ipava silt loam; 0-3% slopes	Fine, montmorillonitic, mesic Aquic Argiudolls
Jules silt loam[a]	Coarse-silty, mixed (calcareous), mesic Typic Udifluvents
Keomah silt loam	Fine, montmorilonitic, mesic Aeric Ochraqualfs
Lawson silt loam	Fine-silty, mixed, mesic Cumulic Hapludolls
Lenzburg silty clay loam, 1-7% slopes; silt loam, 10-20% slopes; loam, 20-70% slopes	Fine-loamy, mixed (calcareous), mesic Typic Udorthents
Littleton silt loam, 1-3% slopes	Fine-silty, mixed, mesic Cumulic Hapludalfs
Marseilles silt loam, 10-15% slopes, eroded	Fine-silty, mixed, mesic Typic Hapludalfs
Orion silt loam	Coarse-silty, mixed, nonacid, mesic Aquic Udifluvents
Orthents, silty, gently sloping	Loamy, mixed, mesic Udorthents
Paxico silt loam, frequently flooded, brief duration[a]	Coarse-silty, mixed (calcareous), mesic Aeric Fluvaquents
Radford silt loam	Fine-silty, mixed, mesic Fluvaquentic Hapludolls
Rapatee silty clay loam, 1-7% slopes; 5-12% slopes	Fine-silty, mixed, nonacid, mesic Typic Udorthents
Rozetta silt loam, 1-5% slopes; 5-10% slopes, eroded	Fine-silty, mixed, mesic Typic Hapludalfs
Sable silty clay loam	Fine-silty, mixed, mesic Typic Haplaquolls
Sawmill silty clay loam; overwash	Fine-silty, mixed, mesic Cumulic Haplaquolls

[a] See footnote at end of table

Table 1. Soils Occuring in the Petition Site and Buffer Area, Including Quantities and Taxonomy

Soil Name	Mapping Units in Study Area	Hectares within Petition	% Petition	% Buffer	% Knox Co.
Sylvan silty clay loam, 5-10% slopes, severly eroded; 10-15% slope, severely eroded; 15-20% slopes, severely eroded	19C3, 19D3^{b}, 19E3	10.52	0.40	0.99	0.5
Tama silt loam, 1-4% slopes 2-5% slopes, eroded; 5-10% slopes, eroded; 10-15% slopes, eroded	36B, 36B2, 36C2, 36D2	1086.31	41.69	26.98	24.9
	TOTAL	2610.24			

Table 1. Soils Occuring in the Petition Site and Buffer Area, Including Quantities and Taxonomy (cont.)

Soil Name	Family or higher taxonomic class
Sylvan silty clay loam, 5-10% slopes, severly eroded; 10-15% slope, severely eroded; 15-20% slopes, severely eroded	Fine-silty, mixed, mesic Typic Hapludalfs
Tama silt loam, 1-4% slopes; 1-4% slopes, eroded; 5-10% slopes, eroded; 10-15% slopes, eroded	Fine-silty, mixed, mesic Typic Arquiudolls

[a] soil series appears in buffer zone but not within petition site
[b] soil series appears in the petition site, but this mapping unit is only in the buffer zone

Table 2. Productivity Indices, Capability Classes, Prime and High Capability Farmland, and Erosion Factors of Petition and Buffer Soils

Soil Series	Soil Mapping Unit	Prime Farm-land	High Capability	Capability Class	Productivity Indices: Unadjusted: Basic Manage-Ment	Unadjusted: High Manage-ment	Adjusted: Basic Manage-ment	Adjusted: High Manage-ment	Restriction Causing Adjustment	Erosion Factors: K (Surface)	T	Erodibility
Alvin	131D	no	yes	IIIe	65	105	59	99	slope	.24	5	3
Assumption	259C2	no	yes	IIIe	70	125	63	118	slope, erosion	.32	3	7
	259D2	no	yes	IIIe			60	111	slope, erosion	.32		
	259D3	no	no	IVe			53	104	slope, erosion	.43		
Atlas[c]	7D3	no	no	VIe	30	55	17	39	slope, erosion	.32	2	7
Camden	134C2	no	yes	IIIe	70	120	63	114	slope, erosion	.37	5	6
Clarksdale	257	yes[d]		I	90	135	90	135	none	.37	5	6
Coatsburg[c]	660C2	no	yes	IIIe	40	75	31	67	slope, erosion	.37	2	6
Denny	45	yes[d]		IIw	70	110	70	110	none	.37	3	6
Dorchester[a]	239	yes[f]		IIw	80	130	80	130	none	.37	5	6
Downs	386B	yes		IIe	90	140	86	139	slope	.32	5	6
Elco	119D2	no	yes	IIIe	65	110	55	100	slope, erosion	.37	4	6
	119E[b]	no	no	IVe			55	96	slope	.37		
	119E2	no	no	IVe			51	91	slope, erosion	.37		
Elkhart	567B2	yes		IIe	75	125	70	121	slope, erosion	.32	4	7

See footnotes at end of table

Table 2. Productivity Indices, Capability Classes, Prime and High Capability Farmland, and Erosion Factors of Petition and Buffer Soils (cont.)

Soil Series	Soil Mapping Unit	Prime Farm-land	High Capability	Capability Class	Productivity Indices Unadjusted Basic Manage-Ment	Productivity Indices Unadjusted High Manage-ment	Productivity Indices Adjusted Basic Manage-ment	Productivity Indices Adjusted High Manage-ment	Restriction Causing Adjustment	Erosion Factors K (Surface)	Erosion Factors T	Erosion Factors Erodibility
	567C2	no	yes	IIIe			68	117	slope, erosion	.32		
	567D3[b]	no	no	IVe			56	108	slope, erosion	.32		
Fayette	280B[b]	yes		IIe	75	125	74	124	slope	.37	5	6
	280C2[b]	no	yes	IIIe			68	118	slope, erosion	.37		
	280D2	no	yes	IIIe			64	112	slope, erosion	.37		
Hickory	8D	no	yes	IIIe	35	80	32	77	slope	.37	5	6
	8D2	no	yes	IIIe			30	72	slope, erosion	.37		
	8E[b]	no	no	VIe			24	64	slope,	.37		
	8E2	no	no	VIe			22	62	slope, erosion	.37		
	8G	no	no	VIIe			16	0	slope	.37		
Huntsville	77	yes		IIw	100	150	100	150	none	.28	5	6
Ipava	43[b]	yes		I	100	160	100	160	none	.28	5	6
	43A	yes		I			100	160	slope	.28		
Jules[a]	28	yes[f]		IIw	70	125	70	125	none	.37	5	
Keomah	17	yes[d]		IIw	75	125	75	125	none	.37	5	6

See footnotes at end of table

Table 2. Productivity Indices, Capability Classes, Prime and High Capability Farmland, and Erosion Factors of Petition and Buffer Soils (cont.)

Soil Series	Soil Mapping Unit	Prime Farm-land	High Capability	Capability Class	Productivity Indices: Unadjusted Basic Manage-Ment	Unadjusted High Manage-ment	Adjusted Basic Manage-ment	Adjusted High Manage-ment	Restriction Causing Adjustment	Erosion Factors: K (Surface)	T	Erodibility
Lawson	451	yes		IIw	100	155	100	155	none	.28	5	5
Lenzburg	871B	yes		IIe	g	g	g	70	slope	.37	5	4L
	871D	no	no	VIe	g	g	g	[illegible]	slope	.37		
	871G	no	no	VIIe	0	0	0	0	slope	.37		
Littleton	81B	yes		IIe	100	155	98	155	slope	.32	5	6
Marseilles[c]	549D2	no	no	IVe	60	105	47	92	slope, erosion	.37	4	6
Orion	415	yes[f]		IIw	80	130	80	130	none	.37	5	5
Orthents	801B	no		g	g	g	g	g		g	g	g
Paxico[a]	406	yes[d, f]		IIIw	g	g	g	100		.37	5	g
Radford	74	yes		IIw	90	110	90	110	none	.28	5	6
Rapatee	872B	yes		IIe	g	g	g	105		.37	5	7
	872C[b]	no	yes	IIIe	g	g	g	100	slope	.37		
Rozetta	279B	yes		IIe	75	125	74	124	slope	.37	5	6
	279C2	no	yes	IIIe			68	115	slope, erosion			
Sable	68	yes[d]		IIw	100	155	100	155	none	.28		6

See footnotes at end of table

Table 2. Productivity Indices, Capability Classes, Prime and High Capability Farmland, and Erosion Factors of Petition and Buffer Soils (cont.)

Soil Series	Soil Mapping Unit	Prime Farm-land	High Capability	Capability Class	Productivity Indices: Unadjusted Basic Manage-Ment	Productivity Indices: Unadjusted High Manage-ment	Productivity Indices: Adjusted Basic Manage-ment	Productivity Indices: Adjusted High Manage-ment	Restriction Causing Adjustment	Erosion Factors: K (Surface)	Erosion Factors: T	Erosion Factors: Erodibility
Sawmill	107[b]	yes[d, f]		IIw	100	140	100	140	none	.28	5	7
	107+	yes[d, f]		IIw			100	140	slope, erosion	.28	5	
Sylvan	19C3	no	no	IVe	60	110	48	96	slope, erosion	.37		7
	19D3[b]	no	no	IVe			45	91	slope, erosion	.37	4	
	19DE[b]	no	no	VIe			41	86	slope, erosion	.37		
Tama	36B	yes		IIe	100	150	98	149	slope	.32	5	7
	36B2	yes		IIe			93	146	slope, erosion	.32		
	36C2	no	yes	IIIe			90	141	slope, erosion	.32		
	36D2	no	yes	IIIe			85	135	slope, erosion	.32		

[a]soil series appears in buffer zone but not within petition site
[b]soil series appears in the petition site, but this mapping unit is only in the buffer zone
[c]unfavorable subsoils
[d]where drained
[f]where protected from flooding
[g]data unavailable

Table 3. Soil Genesis, Water, and Corrosivity Properties of Petition and Buffer Soils

Soil Series	Soil Formed In	Flooding			High Water Table			Potential Frost Action	Corrosivity	
		Frequency	Duration	Months	Depth	Kind	Months		Steel	Concrete
Alvin	loess and alluvium-terrace	None			>6.0			Moderate	Low	High
Assumption	loess and glacial till-upland	None			3.0-4.5	Perched	Feb-May	High	High	Moderate
Atlas	loess and glacial till-upland	None			0-2.0	Perched	Apr-Jun	High	High	Moderate
Camden	loess and loamy sediments-terrace	None			4.0-6.0	Apparent	Mar-Jun	High	Low	Moderate
Clarksdale	loess-upland	None			1.0-3.0	Apparent	Mar-Jun	High	High	Moderate
Coatsburg	loess and glacial till-upland	None			0-1.0	Perched	Apr-Jun	High	High	Moderate
Denny	loess-upland	None			+.5-2.0	Apparent	Mar-May	High	High	Moderate
Dorchester[a]	alluvium-bottomland	Frequent	Very Brief	Feb-Nov	>6.0			High	High	Low
Downs	loess-terrace and upland	None			4.0-6.0	Apparent	Mar-Jun	High	Moderate	Moderate
Elco	loess and glacial till-upland	None			2.5-4.5	Perched	Mar-May	High	High	Moderate
Elkhart	loess-upland	None			>6.0			High	High	Moderate
Fayette	loess-upland	None			>6.0			High	Moderate	Moderate
Hickory	glacial till and weathered shale and siltstone-upland	None			>6.0			Moderate	Moderate	Moderate

See footnote at end of table

Table 3. Soil Genesis, Water, and Corrosivity Properties of Petition and Buffer Soils (cont.)

Soil Series	Soil Formed In	Flooding			High Water Table			Potential Frost Action	Corrosivity	
		Frequency	Duration	Months	Depth	Kind	Months		Steel	Concrete
Huntsville	alluvium-bottomland	Occasional	Very Brief	Jan-May	>6.0			High	Low	Low
Ipava	loess-upland	None			1.0-3.0	Apparent	Mar-May	High	High	Moderate
Jules[a]	alluvium-bottomland	Frequent	Very Brief	Mar-Jun	>6.0			High	Low	Low
Keomah	loess-upland	None			2.0-4.0	Apparent	Nov-Jul	High	High	Moderate
Lawson	alluvium-bottomland	Occasional	Brief-Long	Mar-May	1.0-3.0	Apparent	Nov-May	High	Moderate	Low
Lenzburg	regolith in surface-mined areas-upland	None			>6.0			Moderate	Moderate	Low
Littleton	alluvium-terrace	None			1.0-3.0	Apparent	Apr-Jun	High	High	Low
Marseilles	weathered siltstone and shale-upland	None			>6.0			High	High	Moderate
Orion	alluvium-bottomland	Frequent	Brief	Mar-May	1.0-3.0	Apparent	Nov-May	High	High	Low
Orthents	g	g								
Paxico[a]	alluvium-bottomland	Frequent	Brief	Mar-May	1.5-3.0	Apparent	Mar-May	High	High	Low
Radford	alluvium-bottomland	Occasional	Brief	Mar-May	1.0-3.0	Apparent	Mar-Jun	High	High	Low

See footnotes at end of table

Tabl 3. Soil Genesis, Water, and Corrosivity Properties of Petition and Buffer Soils (cont.)

Soil Series	Soil Formed In	Flooding			High Water Table			Potential Frost Action	Corrosivity	
		Frequency	Duration	Months	Depth	Kind	Months		Steel	Concrete
Rapatee	silty soil material underlain with regolith-upland	None			>6.0			High	Moderate	Low
Rozetta	loess-upland	None			4.0-6.0	Apparent	Mar-Jun	High	Moderate	Moderate
Sable	loess-upland	None			+.5-2.0	Apparent	Mar-May	High	High	Moderate
Sawmill	alluvium-bottomland	Frequent	Brief	Mar-Jun	0-2.0	Apparent	Mar-Jun	High	High	Low
Sylvan	loess-upland	None			>6.0			High	Moderate	Moderate
Tama	loess-upland	None			4.0-6.0	Apparent	Nov-Jun	High	Moderate	Moderate

[a]Soil series appears in buffer zone but not within petition site
[g]data unavailable

Table 4. Yield Estimates for Various Crops and Timber on Soils Found at the Petition Site (under a high level of management)

Soil Series	Mapping Unit	Corn (bu)+	Soybeans (bu)	Wheat (bu)	Oats (bu)	Grass-legume Hay (Tons)	Brome-alfalfa Pasture (AUM)*	Deciduous Timber (bd ft)**	Coniferous Timber (Cords)
Alvin	131D	92	31	45	--	4.0	6.7	163	1.4
Assumption	259C2	123	37	54	74	4.8	8.0	282	1.5
	259D2	116	35	51	70	4.6	7.6	270	1.4
	259D3	91	--	40	55	3.6	5.9	249	1.3
Atlas	7D3	--	--	15	34	1.7	2.8	83	0.5
Cumden	134C2	121	38	53	70	5.0	8.2	306	1.6
Clarksdale	257	140	43	57	79	5.3	8.5	---	---
Coatsburg	660C2	73	23	25	40	2.9	4.8	141	0.8
Denny	45	113	37	47	62	4.0	6.7	225	1.0
Downs	386B	147	43	58	82	5.5	9.2	---	---
Elco	119D2	104	34	44	60	4.1	6.8	225	1.3
	119E2	97	--	41	56	3.8	6.4	218	1.2
Elkhart	567B2	131	39	52	72	5.0	8.4	336	1.6
	567C2	128	38	51	71	4.9	8.2	329	1.6

See footnote at end of table

Table 4. Yield Estimates for Various Crops and Timber on Soils Found at the Petition Site (under a high level of management) (cont.)

Soil Series	Mapping Unit	Corn (bu)+	Soybeans (bu)	Wheat (bu)	Oats (bu)	Grass-legume Hay (Tons)	Brome-alfalfa Pasture (AUM)*	Deciduous Timber (bd ft)**	Coniferous Timber (Cords)
Fayette	280D2	116	35	48	66	4.7	7.8	360	1.6
Hickory	8D	72	23	26	50	2.7	4.5	209	1.1
	8D2	72	23	26	50	2.7	4.5	203	1.1
	8E2	---	--	--	--	2.1	3.6	189	1.0
	8G	---	--	--	--	---	3.0	108	0.6
Huntsville	77	106	34	45	60	4.1	6.8	---	---
Ipava	43A	163	52	66	91	6.1	10.2	---	---
Keomah	17	129	39	52	72	5.1	8.6	300	1.4
Lawson	451	130	43	--	80	5.5	---	---	---
Lenzburg	871B	75	23	26	--	3.4	5.5	---	---
	871D	---	--	--	--	2.5	4.2	---	---
	871G	---	--	--	--	---	3.8	---	---
Littleton	81B	157	49	62	89	6.0	10.1	---	---
Marseilles	549D2	90	--	40	56	3.8	6.3	158	0.8

See footnote at end of table

Table 4. Yield Estimates for Various Crops and Timber on Soils Found at the Petition Site (under a high level of management) (cont.)

Soil Series	Mapping Unit	Corn (bu)[+]	Soybeans (bu)	Wheat (bu)	Oats (bu)	Grass-legume Hay (Tons)	Brome-alfalfa Pasture (AUM)[*]	Deciduous Timber (bd ft)[**]	Coniferous Timber (Cords)
Orion	415	115	35	--	61	4.0	6.6	425-575	0
Orthents	801B	---	--	--	--	---	---	---	---
Radford	74	98	29	33	68	3.6	5.8	---	---
Rapatee	872B	100	35	47	--	4.2	4.5	---	---
Rozetta	279B	130	40	53	72	5.1	8.6	329	1.4
	279C2	123	38	51	69	4.9	8.2	315	1.5
Sable	68	156	51	61	85	5.6	9.3	---	---
Sawmill	107+	147	47	54	76	5.5	8.8	---	---
Sylvan	19C3	97	30	46	57	4.3	7.2	283	1.4
Tama	36B	153	46	61	88	5.8	9.7	---	---
	36B2	149	44	60	85	5.7	9.4	---	---
	36C2	146	43	58	84	5.5	9.2	---	---

See footnote at end of table

Table 4. Yield Estimates for Various Crops and Timber on Soils Found at the Petition Site (under a high level of management) (cont.)

Soil Series	Mapping Unit	Corn (bu)+	Soybeans (bu)	Wheat (bu)	Oats (bu)	Grass-legume Hay (Tons)	Brome-alfalfa Pasture (AUM)*	Deciduous Timber (bd ft)**	Coniferous Timber (Cords)
	36D2	140	41	56	80	53	8.8	---	---

+All yields are per acre unless otherwise noted

*Animal unit months

**Timber yield is given as annual timber growth per acre. It is not given for soils with a basic management grain crop productivity index of 85 or greater or for soils otherwise unsuitable for timber production

Table 5. Soils by Land Use Types for the Petition Area

Soil Series and Mapping Unit		Cropland (ha)	Pasture/Hayland (ha)	Woodland (ha)	Barren (ha)	Built-up (ha)
Alvin	131D	-----	a	a	-----	-----
Assumption	259C2	50.67	7.04	a	-----	-----
	259D2	10.27	-----	-----	-----	-----
	259D3	a	a	-----	-----	-----
Atlas	7D3	-----	3.89	-----	-----	-----
Camden	134C2	-----	a	-----	-----	-----
Clarksdale	257	10.26	-----	-----	-----	-----
Coatsburg	660C2	a	a	-----	-----	-----
Denny	45	2.90	-----	-----	-----	-----
Downs	386B	28.58	18.75	a	a	-----
Elco	119D2	19.15	32.73	16.87	-----	-----
	119E2	a	4.32	a	-----	-----
Elkhart	567B2	3.60	-----	-----	-----	-----
	567C2	36.79	12.11	a	-----	-----
Fayette	280D2	-----	a	2.30	-----	-----
Hickory	8D	2.19	-----	-----	-----	-----
	8D2	18.42	21.96	5.90	-----	-----
	8E2	a	14.91	-----	-----	-----
	8G	-----	-----	a	a	-----
Huntsville	77	a	a	-----	-----	-----
Ipava	43A	293.49	30.26	-----	1.10	2.12
Keomah	17	1.65	a	a	-----	
Lawson	451	6.41	6.21	9.58	-----	-----
Lenzburg	871B	12.36	192.21	-----	-----	-----
	871D	8.83	215.24	a	7.34	-----
	871G	2.11	138.89	2.68	-----	-----

See footnotes at end of table

Table 5. Soils by land use types for the petition area (cont.)

Soil Series and Mapping Unit		Cropland (ha)	Pasture/Hayland (ha)	Woodland (ha)	Barren (ha)	Built-up (ha)
Littleton	81B	2.59	1.60	1.27	-----	-----
Marseilles	549D2	-----	a	-----	-----	-----
Orion	415	1.15	1.91	-----	-----	-----
Orthents	801B	a	a	-----	-----	-----
Radford	74	28.88	20.47	16.41	-----	-----
Rapatee	872B	a	1.36	-----	-----	-----
Rozetta	279B	12.07	9.06	2.43	-----	-----
	279C2	14.00	15.87	4.21	a	-----
Sable	68	53.70	3.90	-----	-----	-----
Sawmill	107+	3.30	1.24	4.00	-----	-----
Sylvan	19C3	10.53	-----	a	-----	-----
Tama	36B	528.34	122.55	-----	a	16.03
	36B2	230.44	32.17	-----	-----	a
	36C2	126.38	39.13	a	-----	1.47
	36D2	-----	1.81	-----	-----	-----
Total		1521.49[b]	954.07[b]	69.77[b]	10.17	19.78

[a] less than one hectare. May be the result of registration error between the soils and land use files or it is a very small soils class within the petition area.

[b] Excludes water bodies hectares.

Table 6. Land Uses to Which the Major Soil Series in the Petition Area are Devoted

Soil Series	Cropland %	Pasture/ Hayland %	Woodland %	Barren %	Built-up %
Assumption	89	11	--	--	--
Downs	60	39	--	1	--
Elco	27	50	23	--	--
Elkhart	76	23	1	--	--
Hickory	33	57	10	--	--
Ipava	90	9	--	0.3	0.7
Lenzburg	4	94	1	1	--
Radford	44	31	25	--	--
Rozetta	45	43	12	--	--
Sable	93	7	--	--	--
Tama	80	18	--	--	2

Table 7. Suitability of Petition and Buffer Soils for Woodland Management and Productivity*

Soil Name and Map Symbol	Ordination Symbol	Management Concerns: Erosion Hazard	Equipment Limitation	Seedling Mortality	Windthrow Hazard	Potential Productivity: Common Trees	Site Index Class**	Productivity	Trees to Plant
131D----------- Alvin	4A	Slight	Slight	Slight	Slight	White oak---------	80	4	Green ash, black walnut, yellow-poplar, white oak, eastern white pine, American sycamore, sugar maple.
						Northern red oak--	80	4	
						Black walnut------	---	---	
						Yellow-poplar-----	90	6	
7D3------------ Atlas	4C	Slight	Slight	Moderate	Moderate	White oak----------	70	4	Green ash, pine oak, red maple, Austrian pine.
						Northern red oak---	70	4	
						Bur oak -----------	70	---	
						Green ash----------	---	---	
134C2---------- Camden	7A	Slight	Slight	Slight	Slight	Yellow-poplar-----	95	7	White ash, white oak, black walnut, eastern white pine, red pine, yellow-poplar, black locust.
						Green ash---------	76	3	
						White oak---------	85	4	
						Northern red oak--	85	4	
						Sweetgum----------	80	6	

See footnote at end of table

Table 7. Suitability of Petition and Buffer Soils for Woodland Management and Productivity (cont.)

Soil Name and Map Symbol	Ordination Symbol	Management Concerns				Potential Productivity			Trees to Plant
		Erosion Hazard	Equipment Limitation	Seedling Mortality	Windthrow Hazard	Common Trees	Site Index Class**	Productivity	
239[a]------------ Dorchester	3A	Slight	Slight	Slight	Slight	White oak Northern red oak	55 55	3 3	Hackberry, green ash, cottonwood.
386B----------- Downs	4A	Slight	Slight	Slight	Slight	White oak--------- Northern red oak-- Yellow-poplar----- Black walnut------	80 80 90 ---	4 4 6 ---	Eastern white pine, northern red oak, green ash, yellow-poplar.
119D2---------- Elco	4A	Slight	Slight	Slight	Slight	White oak---------- Northern red oak--- Black walnut-------	80 --- ---	4 --- ---	White oak, northern red oak, black walnut, green ash, eastern white pine, white ash.

See footnotes at end of table

Table 7. Suitability of Petition and Buffer Soils for Woodland Management and Productivity (cont.)

Soil Name and Map Symbol	Ordination Symbol	Management Concerns: Erosion Hazard	Equipment Limitation	Seedling Mortality	Windthrow Hazard	Potential Productivity: Common Trees	Site Index Class**	Productivity	Trees to Plant
119E[b], 119E2--- Elco	4R	Moderate	Moderate	Moderate	Slight	White oak----------	80	4	White oak, northern red oak, black walnut, green ash, eastern white pine white ash.
						Northern red oak---	---	---	
						Black walnut-------	---	---	
280B[b], 280C2[b]-- 280D2--------- Fayette	4A	Slight	Slight	Slight	Slight	White oak---------	80	4	Eastern white pine, northern red oak, green ash, yellow-poplar.
						Northern red oak--	80	4	
						Yellow-poplar-----	90	6	
						Black walnut------	---	---	
8D, 8D2------- Hickory	4A	Slight	Slight	Slight	Slight	White oak----------	85	4	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
						Northern red oak---	85	4	
						Black oak----------	---	---	
						Green ash----------	---	---	
						Bitternut hickory--	---	---	
						Yellow-poplar------	95	7	

See footnotes at end of table

Table 7. Suitability of Petition and Buffer Soils for Woodland Management and Productivity (cont.)

Soil Name and Map Symbol	Ordination Symbol	Management Concerns: Erosion Hazard	Equipment Limitation	Seedling Mortality	Windthrow Hazard	Potential Productivity: Common Trees	Site Index Class**	Productivity	Trees to Plant
8E[b], 8E2------- Hickory	4R	Moderate	Moderate	Slight	Slight	White oak----------	85	4	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
						Northern red oak--	85	4	
						Black oak----------	---	---	
						Green ash----------	---	---	
						Bitternut hickory--	---	---	
						Yellow-poplar------	95	7	
8G------------- Hickory	4R	Severe	Severe	Slight	Slight	White oak----------	85	4	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
						Northern red oak--	85	4	
						Black oak----------	---	---	
						Green ash----------	---	---	
						Bitternut hickory--	---	---	
						Yellow-poplar------	95	7	
871B----- --- Lenzburg	3A	Slight	Slight	Slight	Slight	Black walnut------	73	---	Black walnut green ash, white ash, eastern cottonwood.
						Sweetgum----------	---	---	
						Eastern cottonwood	---	---	

See footnotes at end of table

Table 7. Suitability of Petition and Buffer Soils for Woodland Management and Productivity (cont.)

Soil Name and Map Symbol	Ordination Symbol	Management Concerns: Erosion Hazard	Equipment Limitation	Seedling Mortality	Windthrow Hazard	Potential Productivity: Common Trees	Site Index Class**	Productivity	Trees to Plant
871D----------- Lenzburg	3R	Moderate	Moderate	Slight	Slight	Black walnut------	73	---	Black walnut green ash, white ash, eastern cottonwood.
						Sweetgum----------	---	---	
						Eastern cottonwood	---	---	
871G----------- Lenzburg	3R	Severe	Severe	Slight	Slight	Black walnut------	73	---	Black walnut green ash, white ash, eastern cottonwood.
						Sweetgum----------	---	---	
						Eastern cottonwood	---	---	
549D2---------- Marseilles	3A	Slight	Slight	Slight	Slight	White oak---------	66	3	White oak, northern red oak, black oak, white ash, eastern white pine, scotch pine,
						Northern red oak--	66	3	
						Black oak---------	---	---	
						White ash---------	---	---	
415------------ Orion	2W	Slight	Moderate	Slight	Slight	Silver maple------	80	2	White spruce, silver maple, white ash, eastern cottonwood. black walnut.
						Red maple---------	---	---	
						White ash---------	---	---	

See footnote at end of table

Table 7. Suitability of Petition and Buffer Soils for Woodland Management and Productivity (cont.)

Soil Name and Map Symbol	Ordination Symbol	Management Concerns: Erosion Hazard	Equipment Limitation	Seedling Mortality	Windthrow Hazard	Potential Productivity: Common Trees	Site Index Class**	Productivity	Trees to Plant
406[a]----------- Paxico	5A	Slight	Slight	Slight	Slight	Pin oak-----------	96	5	American sycamore, silver maple, white ash, eastern cottonwood.
						Sweetgum----------	86	---	
						Eastern cottonwood	---	---	
						American sycamore-	---	---	
						White ash---------	---	---	
279B, 279C2---- Rozetta	4A	Slight	Slight	Slight	Slight	White oak---------	80	4	Eastern white pine, northern red oak, green ash, Scotch pine, yellow-poplar.
						Northern red oak--	80	4	
						Yellow-poplar-----	90	6	
						Black walnut------	---	---	
107[b], 107+---- Sawmill	4W	Slight	Moderate	Moderate	Moderate	Pin oak------------	90	4	American sycamore, hackberry, green ash, pin oak, red mapel, swamp white oak.
						Eastern cottonwood-	---	---	
						Sweetgum-----------	---	---	
						Cherrybark oak-----	---	---	
						American sycamore--	---	---	

See footnotes at end of table

Table 7. Suitability of Petition and Buffer Soils for Woodland Management and Productivity (cont.)

Soil Name and Map Symbol	Ordination Symbol	Management Concerns				Potential Productivity			Trees to Plant
		Erosion Hazard	Equipment Limitation	Seedling Mortality	Windthrow Hazard	Common Trees	Site Index Class**	Productivity	
19C3, 19D3[b]----- Sylvan	6A	Slight	Slight	Slight	Slight	Yellow-poplar------ White oak---------- Northern red oak--- Black walnut-------	90 80 80 ---	6 4 4 ---	White oak black walnut, northern red, oak, green ash, eastern white pine, red pine, sugar maple.
19E3[b] Sylvan	[g]								

*Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available

**Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

[a]soil series appears in buffer zone but not within petition site

[b]soil series appears in the petition site, but this mapping unit is only in the buffer zone

[g]data unavailable

Table 8. Suitability of Petition and Buffer Soils for Recreation

Soils Series and Mapping Unit	Camp Areas	Picnic Areas	Playgrounds	Paths and Trails	Golf Fairways
Alvin, 131D	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
Assumption, 259C2	Moderate: percs slowly	Moderate: percs slowly	Severe: slope	Slight	Slight
259D2	Moderate: slope, percs slowly	Moderate: slope, percs slowly	Severe: slope	Slight	Moderate: Slope
259D3	Moderate: slope, percs slowly	Moderate: slope, percs slowly	Severe: slope	Severe: erodes easily	Moderate: slope
Atlas, 7D3	Severe: wetness, percs slowly	Severe: wetness, percs slowly	Severe: slope, wetness, percs slowly	Severe: wetness	Severe: wetness
Camden, 134C2	Slight	Slight	Severe: slope	Slight	Slight
Clarksdale, 257	Severe: wetness	Moderate: wetness, percs slowly	Severe: wetness	Moderate: wetness	Moderate: wetness
Coatsburg, 66UC2	Severe: wetness, percs slowly	Severe: wetness, percs slowly	Severe: slope, wetness, percs slowly	Severe: wetness, erodes easily	Severe: wetness
Denny, 45	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding

Soils Series and Mapping Unit	Camp Areas	Picnic Areas	Playgrounds	Paths and Trails	Golf Fairways
Dorchester, 239[a]	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
Downs, 386B	Slight	Slight	Moderate: Slope	Slight	Slight
Elco, 119D2	Moderate: slope, percs slowly	Moderate: slope, percs slowly	Severe: slope	Severe: erodes easily	Moderate: slope
119E[b]	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily	Severe: slope
119E2	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily	Severe: slope
Elkhart, 567B2	Slight	Slight	Moderate: slope	Slight	Slight
567C2	Slight	Slight	Severe: slope	Slight	Slight
567D3[b]	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
Fayette, 280B[b]	Slight	Slight	Moderate: slope	Slight	Slight
280C2[b]	Slight	Slight	Severe: slope	Slight	Slight

See footnotes at end of table

Table 8. Suitability of Petition and Buffer Soils for Recreation (cont.)

Soils Series and Mapping Unit	Camp Areas	Picnic Areas	Playgrounds	Paths and Trails	Golf Fairways
280D2	Moderate: slope	Moderate: slope	Severe: slope	Severe: erodes easily	Moderate: slope
Hickory, 8D, 8D2	Moderate: slope	Moderate: slope	Severe: slope	Severe: erodes easily	Moderate: slope
8E[b], 8E2	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily	Severe: slope
8G	Severe: slope	Severe: slope	Severe: slope	Severe: slope, erodes easily	Severe: slope
Huntsville, 77	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
Ipava, 43[b], 43A	Severe: wetness	Moderate: wetness, percs slowly	Severe: wetness	Moderate: wetness	Moderate: wetness
Jules 28[a]	g				
Keomah, 17	Moderate: wetness, percs slowly	Moderate: wetness, percs slowly	Moderate: wetness, percs slowly	Slight	Slight
Lawson, 451	Severe: flooding, wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness, flooding

See footnotes at end of table

Table 8. Suitability of Petition and Buffer Soils for Recreation (cont.)

Soils Series and Mapping Unit	Camp Areas	Picnic Areas	Playgrounds	Paths and Trails	Golf Fairways
Lenzburg 871B	Moderate: percs slowly	Moderate: percs slowly	Moderate: slope, small stones	Severe: erodes easily	Moderate: large stones
871D	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily	Severe: slope
871G	Severe: slope	Severe: slope	Severe: slope	Severe: slope, erodes easily	Severe: slope
Littleton, 81B	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness
Marseilles, 549D2	Moderate: slope, percs slowly	Moderate: slope, percs slowly	Severe: slope	Severe: erodes easily	Severe: slope
Orion, 415	Severe: flooding, wetness	Moderate: flooding, wetness	Severe: wetness, flooding	Moerate: wetness, flooding	Severe: flooding
Orthents, 801B	g				
Paxico, 406[a]	g				
Radford, 74	Severe: flooding, wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness, flooding

See footnotes at end of table

Table 8. Suitability of Petition and Buffer Soils for Recreation (cont.)

Soils Series and Mapping Unit	Camp Areas	Picnic Areas	Playgrounds	Paths and Trails	Golf Fairways
Rapatee, 872B	Moderate: percs slowly	Moderate: percs slowly	Moderate: slope, percs slowly	Slight	Moderate: droughty
872C[b]	g				
Rozetta, 279B	Slight	Slight	Moderate: slope	Slight	Slight
279C2	Slight	Slight	Severe: slope	Slight	Slight
Sable, 68	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe ponding
Sawmill, 107[b], 107+	Severe: flooding, wetness	Severe: wetness	Severe: wetness, flooding	Severe: wetness	Severe: wetness, flooding
Sylvan, 19C3	Slight	Slight	Severe: slope	Slight	Slight
19D3[b]	Moderate: slope	Moderate: slope	Severe: slope	Severe: erodes easily	Moderate: slope
19E3[b]	g				
Tama, 36B, 36B2	Slight	Slight	Moderate: slope	Slight	Slight

See footnotes at end of table

Table 8. Suitability of Petition and Buffer Soils for Recreation (cont.)

Soils Series and Mapping Unit	Camp Areas	Picnic Areas	Playgrounds	Paths and Trails	Golf Fairways
36C2	Slight	Slight	Severe: slope	Slight	Slight
36D2	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope

[a]soil series appears in buffer zone but not within petition site
[b]soil series appears in the petition site, but this mapping unit is only in the buffer zone
[g]data unavailable

Table 9. Suitability of Petition and Buffer Soils for Wildlife Habitat

Soils Series and Mapping Units	Grain and Seed Crops	Grasses and Legumes	Wild Herbaceous Plants	Hardwood Trees	Wetland Plants	Shallow Water Areas	Openland Wildlife	Woodland Wildlife	Wetland Wildlife
Alvin, 131D	Fair	Good	Good	Good	Very Poor	Very Poor	Good	Good	Very Poor
Assumption, 259C2, 259D2, 259D3	Fair	Good	Good	Good	Very Poor	Very Poor	Good	Good	Very Poor
Atlas, 7D3	Fair	Good	Good	Good	Poor	Very Poor	Good	Good	Very Poor
Camden, 134C2	Fair	Good	Good	Good	Poor	Very Poor	Good	Good	Very Poor
Clarksdale, 257	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
Coatsburg, 660C2	Fair	Fair	Fair	Fair	Very Poor	Very Poor	Fair	Fair	Very Poor
Denny, 45	Good	Good	Good	Fair	Good	Good	Good	Fair	Good
Dorchester, 239[a]	Fair	Fair	Fair	Fair	Poor	Poor	Fair	Poor	Poor
Downs, 386B	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Elco, 119D2	Fair	Good	Good	Good	Very Poor	Very Poor	Good	Good	Very Poor
119E[b], 119E2	Poor	Fair	Good	Good	Very Poor	Very Poor	Fair	Good	Very Poor
Elkhart, 567B2, 567C2	Good	Good	Good	Good	Poor	Very Poor	Good	Good	Very Poor
5670D3[b]	Fair	Fair	Good	Good	Very Poor	Very Poor	Fair	Good	Very Poor
Fayette, 280B	Good	Good	Good	Good	Poor	Very Poor	Good	Good	Very Poor

See footnotes at end of table

Table 9. Suitability of Petition and Buffer Soils for Wildlife Habitat (cont.)

Soils Series and Mapping Units	Grain and Seed Crops	Grasses and Legumes	Wild Herbaceous Plants	Hardwood Trees	Wetland Plants	Shallow Water Areas	Openland Wildlife	Woodland Wildlife	Wetland Wildlife
280C2, 280D2	Fair	Good	Good	Good	Poor	Very Poor	Good	Good	Very Poor
Hickory, 8D, 8D2	Fair	Good	Good	Good	Very Poor	Very Poor	Good	Good	Very Poor
8E[b], 8E2	Poor	Fair	Good	Good	Very Poor	Very Poor	Fair	Good	Very Poor
8G	Very Poor	Poor	Good	Good	Very Poor	Very Poor	Poor	Good	Very Poor
Huntsville, 77	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Ipava, 43[b], 43A	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
Jules, 28[a]	g								
Keomah, 17	Good	Good	Fair	Fair	Fair	Fair	Good	Fair	Fair
Lawson, 451	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
Lenzburg, 871B	Good	Good	Good	Good	Poor	Very Poor	Good	Good	Very Poor
871D	Poor	Fair	Good	Good	Very Poor	Very Poor	Fair	Good	Very Poor
871G	Very Poor	Poor	Good	Good	Very Poor	Very Poor	Poor	Good	Very Poor
Littleton, 81B	Fair	Good	Good	Good	Fair	Poor	Good	Good	Poor
Marseilles, 549D2	Fair	Good	Good	Good	Very Poor	Very Poor	Good	Good	Very Poor
Orion, 415	Good	Good	Good	Good	Good	Fair	Good	Good	Good

See footnotes at end of table

Table 9. Suitability of Petition and Buffer Soils for Wildlife Habitat (cont.)

Soils Series and Mapping Units	Grain and Seed Crops	Grasses and Legumes	Wild Herbaceous Plants	Hardwood Trees	Wetland Plants	Shallow Water Areas	Openland Wildlife	Woodland Wildlife	Wetland Wildlife
Orthents, 801B	[g]								
Paxico, 406[a]	[g]								
Radford, 74	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
Rapatee, 872B	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
872C[b]	[g]								
Rozetta, 279B	Good	Good	Good	Good	Very Poor	Very Poor	Good	Good	Very Poor
279C2	Good	Good	Good	Good	Very Poor	Very Poor	Good	Good	Very Poor
Sable, 68	Fair	Good	Good	Fair	Good	Good	Good	Fair	Good
Sawmill, 107[b], 107+	Good	Good	Good	Fair	Good	Fair	Good	Fair	Fair
Sylvan, 19C3, 19D3[b]	Fair	Good	Good	Good	Very Poor	Very Poor	Good	Good	Very Poor
19E3[b]	[g]								
Tama, 36B, 26B2	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
36C2, 36D2	Fair	Good	Good	Good	Very Poor	Very Poor	Good	Good	Very Poor

[a]soil series appears in buffer zone but not within petition site
[b]soil series appears in the petition site, but this mapping unit is only in the buffer zone
[g]data unavailable

Table 10 Suitability of Petition and Buffer Soils for Various Engineering Purposes

Soil Series and Mapping Unit	Roadfill	Topsoil	Shallow Excavations	Dwellings without Basements	Dwellings with Basements	Small Commercial Buildings
Alvin, 131D	Good	Fair: slope	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope
Assumption, 259C2	Poor: low strength	Good	Moderate: wetness	Moderate: shrink-swell	Moderate: wetness, shrink-swell	Moderate: shrink-swell, slope
259D2	Poor: low strength	Fair: slope	Moderate: wetness, slope	Moderate: shrink-swell, slope	Moderate: wetness, slope, shrink-swell	Severe: slope
259D3	Poor: low strength,	Fair; too clayey, slope	Moderate: wetness, slope	Moderate: shrink-swell, slope	Moderate: wetness, slope, shrink-swell	Severe: slope
Atlas, 7D3	Poor low strength, wetness	Poor: thin layer, wetness	Severe: wetness	Severe: wetness, shrink-swell	Severe: wetness, shrink-swell	Severe: wetness, shrink-swell, slope
Camden, 134C2	Good	Good	Moderate: wetness	Moderate: shrink-swell, slope	Moderate: wetness, slope, shrink-swell	Severe: slope
Clarksdale, 257	Poor: low strength	Poor: thin layer	Severe: wetness	Severe: shrink-swell, wetness	Severe: wetness, shrink-swell	Severe: wetness, shrink-swell
Coatsburg, 660C2	Poor: low strength, wetness	Poor: thin layer, wetness	Severe: wetness	Severe: wetness, shrink-swell	Severe: wetness, shrink-swell	Severe: wetness, shrink-swell, slope

Table 10. Suitability of Petition and Buffer Soils for Various Engineering Purposes (cont.)

Soil Series and Mapping Unit	Roadfill	Topsoil	Shallow Excavations	Dwellings without Basements	Dwellings with Basements	Small Commercial Buildings
Denny, 45	Poor: low strength, wetness	Poor: wetness	Severe: ponding	Severe: ponding, shrink-swell	Severe: ponding	Severe: ponding, shrink-swell
Dorchester, 239[a]	Poor: low strength	Good	Severe: excess humus	Severe: flooding	Severe: flooding low strength	Severe: flooding
Downs, 386B	Poor: low strength	Good	Moderate: wetness	Moderate: shrink-swell	Moderate: wetness, shrink-swell	Moderate: shrink-swell
Elco, 119D2	Poor: low strength	Fair: thin layer, slope	Moderate: too clayey, wetness, slope	Moderate: shrink-swell, slope	Moderate: wetness, slope, shrink-swell	Severe: slope
119E[b], 119E2	Poor: low strength	Poor: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Elkhart, 567B2, 567C2	Fair: low strength	Fair: too clayey	Slight	Moderate shrink-swell	Slight	Moderate: shrink-swell
567D3[b]	Fair: low strength	Fair: too clayey, slope	Moderate: slope	Moderate: shrink-swell, slope	Moderate: slope	Severe: slope
Fayette, 280B[b], 280C2[b]	Poor: low strength	Good	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell
280D2	Poor: low strength	Fair: slope	Moderate: slope	Moderate: slope, shrink-swell	Moderate: slope, shrink-swell	Severe: slope

See footnotes at end of table

Table 10 Suitability of Petition and Buffer Soils for Various Engineering Purposes (cont.)

Soil Series and Mapping Unit	Roadfill	Topsoil	Shallow Excavations	Dwellings without Basements	Dwellings with Basements	Small Commercial Buildings
Hickory, 8D, 8D2	Fair: low strength	Fair: small stones, slope	Moderate: slope	Moderate: shrink-swell, slope	Moderate: slope, shrink-swell	Severe: slope
8E[b], 8E2	Fair: low strength, slope	Poor: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
8G	Poor: slope	Poor: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Huntsville, 77	Good	Good	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding
Ipava, 43[b], 43A	Poor: low strength	Poor: thin layer	Severe: wetness	Severe: wetness, shrink-swell	Severe: wetness, shrink-swell	Severe: wetness, shrink-swell
Jules, 28[a]	Fair: low strength	Good	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding
Keomah, 17	Poor: low strength	Fair: thin layer	Severe: wetness	Severe: shrink-swell	Severe: wetness, shrink-swell	Severe: shrink-swell
Lawson, 451	Poor: low strength	Good	Severe: wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness
Lenzburg, 871B	Poor: low strength	Poor: small stones, area reclaim	Moderate: too clayey	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell, slope

See footnotes at end of table

Table 10 Suitability of Petition and Buffer Soils for Various Engineering Purposes (cont.)

Soil Series and Mapping Unit	Roadfill	Topsoil	Shallow Excavations	Dwellings without Basements	Dwellings with Basements	Small Commercial Buildings
871D	Poor: low strength	Poor: small stones, area reclaim, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
871G	Poor: low strength, slope	Poor: small stones, area reclaim, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Littleton, 81B	Poor: low strength	Good	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
Marseilles, 549D2	Poor: depth to rock, low strength	Poor: thin layer	Moderate: depth to rock, too clayey, slope	Moderate: shrink-swell, slope	Moderate: depth to rock, slope, shrink-swell	Severe: slope
Orion, 415	Fair: wetness	Poor: thin layer	Severe: cutbanks cave, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness
Orthents, 801B	[g]					
Paxico, 406[a]	Fair: wetness	Good	Severe: wetness	Severe: flooding	Severe: flooding, wetness	Severe: flooding
Radford, 74	Poor: low strength	Good	Severe: wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness

See footnotes at end of table

Table 10 Suitability of Petition and Buffer Soils for Various Engineering Purposes (cont.)

Soil Series and Mapping Unit	Roadfill	Topsoil	Shallow Excavations	Dwellings without Basements	Dwellings with Basements	Small Commercial Buildings
Rapatee, 872B	Good	Poor: area reclaim	Moderate: sense layer	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell, slope
872C2[a]	g					
Rozetta, 279B, 279C2	Poor: low strength	Good	Moderate: wetness	Moderate: shrink-swell	Moderate: wetness, shrink-swell	Moderate: shrink-swell, slope
Sable, 68	Poor: low strength, wetness	Poor: wetness	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding
Sawmill, 107[b], 107+	Poor: low strength, wetness	Poor: wetness	Severe: wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness
Sylvan, 19C3	Poor: low strength	Fair: too clayey	Slight	Moderate: shrink-swell	Slight	Moderate: shrink-swell, slope
19D3[b]	Poor: low strength	Fair: too clayey, slope	Moderate: slope	Moderate: shrink-swell, slope	Moderate: slope	Severe: slope
19E3[a]	g					
Tama, 36B, 36B2, 36C2	Poor: low strength	Good	Moderate: wetness	Moderate: shrink-swell	Moderate wetness, shrink-swell	Moderate: shrink-swell

See footnotes at end of table

Table 10 Suitability of Petition and Buffer Soils for Various Engineering Purposes (cont.)

Soil Series and Mapping Unit	Roadfill	Topsoil	Shallow Excavations	Dwellings without Basements	Dwellings with Basements	Small Commercial Buildings
36D2	Poor: low strength	Fair: slope	Moderte: wetness, slope	Moderate: shrink-swell, slope	Moderate: wetness, slope, shrink-swell	Severe: slope

[a]soil series appears in buffer zone but not within petition site
[b]soil series appears in the petition site, but this mapping unit is only in the buffer zone
[g]data unavailable

Table 11. Suitability of Petition and Buffer Soils for Various Engineering Purposes

Soil Series and Mapping Unit	Local Roads and Streets	Lawns and Landscaping	Septic Tank Absorption Fields	Sewage Lagoon Areas	Area Sanitary Landfill	Daily Cover for Landfill
Alvin, 131D	Moderate: slope, frost action	Slight	Moderate: slope	Severe: seepage, slope	Severe: seepage	Fair: slope, thin layer
Assumption, 259C2	Severe: low strength, frost action	Slight	Severe: wetness, percs slowly	Severe: slope, wetness	Slight	Fair: too clayey, wetness
259D2	Severe: low strength, frost action	Moderate: slope	Severe: wetness, percs slowly	Severe: slope, wetness	Moderate: slope	Fair: too clayey, slope, wetness
259D3	Severe: low strength, frost action	Moderate: slope	Severe: wetness, percs slowly	Severe: slope, wetness	Moderate: slope	Fair: too clayey, slope, wetness
Atlas, 7D3	Severe: low strength, wetness	Severe: wetness	Severe: wetness, percs slowly	Severe: slope	Severe: wetness	Poor: too clayey, hard to pack
Camden, 134C2	Severe low strength, frost action	Moderate: slope	Moderate: wetness	Severe: seepage, slope	Moderate: wetness	Fair: too clayey
Clarksdale, 257	Severe: shrink-swell, frost action, low strength	Moderate: wetness	Severe: percs slowly, wetness	Severe: wetness	Severe: wetness	Poor: wetness, too clayey, hard to pack
Coatsburg, 660C2	Severe: low strength, wetness	Severe: wetness	Severe: wetness, percs slowly	Severe: slope	Severe: wetness	Poor: too clayey, hard to pack

Table 11. Suitability of Petition and Buffer Soils for Various Engineering Purposes (cont.)

Soil Series and Mapping Unit	Local Roads and Streets	Lawns and Landscaping	Septic Tank Absorption Fields	Sewage Lagoon Areas	Area Sanitary Landfill	Daily Cover for Landfill
Denny, 45	Severe: low strength, ponding, frost action	Severe: ponding	Severe: ponding, perc slowly	Severe: ponding	Severe: ponding	Poor: ponding
Dorchester, 239[a]	Severe: flooding, frost action	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Poor: thin layer
Downs, 386B	Severe: low strength, frost action	Slight	Moderate: wetness	Moderate: seepage, slope, wetness	Moderate: wetness	Fair: too clayey
Elco, 119D2	Severe: low strength, frost action	Moderate: slope	Severe: wetness, percs slowly	Severe: slope, wetness	Moderate: wetness, slope	Poor: too clayey
119E[b], 119E2	Severe: low strength, slope, frost action	Severe: slope	Severe: wetness, percs slowly, slope	Severe: slope, wetness	Severe: slope	Poor: too clayey, slope
Elkhart, 567B2, 567C2	Severe: low strength, frost action	Slight	Slight	Moderate: seepage, slope	Slight	Good
567D3[b]	Severe: low strength, frost action	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Fair: slope

See footnotes at end of table

Table 11. Suitability of Petition and Buffer Soils for Various Engineering Purposes (cont.)

Soil Series and Mapping Unit	Local Roads and Streets	Lawns and Landscaping	Septic Tank Absorption Fields	Sewage Lagoon Areas	Area Sanitary Landfill	Daily Cover for Landfill
Fayette, 280B[b], 280C2[b]	Severe: frost action, low strength	Slight	Slight	Severe: slope, seepage	Slight	Fair: too clayey
280D2	Severe: frost action, low strength	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Fair: slope, too clayey
Hickory, 8D, 8D2	Severe: low strength	Moderate: slope	Moderate: percs slowly, slope	Severe: slope	Moderate: slope	Fair: too clayey, slope
8E[b], 8E2	Severe: low strength, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope
8G	Severe: low strength, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope
Huntsville, 77	Severe: low strength, flooding, frost action	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Good
Ipava, 43[b], 43A	Severe: low strength, frost action, shrink-swell	Moderate: wetness	Severe: wetness, percs slowly	Severe: wetness	Severe: wetness	Poor: too clayey, hard to pack, wetness

See footnote at end of table

Table 11. Suitability of Petition and Buffer Soils for Various Engineering Purposes (cont.)

Soil Series and Mapping Unit	Local Roads and Streets	Lawns and Landscaping	Septic Tank Absorption Fields	Sewage Lagoon Areas	Area Sanitary Landfill	Daily Cover for Landfill
Jules, 28[a]	Severe: flooding, frost action	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Good
Keomah, 17	Severe: shrink-swell, frost action, low strength	Slight	Severe: percs slowly, wetness	Severe: wetness	Severe: wetness	Poor: too clayey hard to pack
Lawson, 451	Severe: low strength, flooding, frost action	Severe: flooding	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Poor: wetness
Lenzburg, 871B	Severe: low strength	Moderate: large stones	Severe: percs slowly	Moderate: slope	Slight	Fair: too clayey, small stones
871D	Severe: low strength, slope	Severe: slope	Severe: percs slowly, slope	Severe: slope	Severe: slope	Poor: slope
871G	Severe: low strength, slope	Severe: slope	Severe: percs slowly, slope	Severe: slope	Severe: slope	Poor: slope
Littleton, 81B	Severe: low strength, frost action	Moderate: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Poor: wetness

See footnote at end of table

Table 11. Suitability of Petition and Buffer Soils for Various Engineering Purposes (cont.)

Soil Series and Mapping Unit	Local Roads and Streets	Lawns and Landscaping	Septic Tank Absorption Fields	Sewage Lagoon Areas	Area Sanitary Landfill	Daily Cover for Landfill
Marseilles, 549D2	Severe: low strength, frost action	Moderate: slope, depth to rock	Severe: depth to rock, percs slowly	Severe: depth to rock, slope	Severe: depth to rock, slope	Poor: depth to rock, too clayey, hard to pack
Orion, 415	Severe: low strength, flooding, frost action	Severe: flooding	Severe: flooding, wetness	Severe: wetness, flooding	Severe: flooding, wetness	Poor: wetness
Orthents, 801B	g					
Paxico, 406[a]	Severe: flooding, frost action	Severe: flooding	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Fair: wetness
Radford, 74	Severe: low strength, flooding, frost action	Moderate: wetness, flooding	Severe: flooding, wetness	Severe: wetness	Severe: flooding, wetness	Poor: wetness
Rapatee, 872B	Severe: low strength, frost action	Moderate: droughty	Severe: percs slowly	Moderate: slope	Slight	Fair: too clayey, small stones
872C2[a]	g					
Rozetta, 279B, 279C2	Severe: low strength, frost action	Slight	Moderate: wetness	Moderate-Severe: seepage, slope, wetness	Moderate: wetness	Fair: too clayey

See footnotes at end of table

Table 11. Suitability of Petition and Buffer Soils for Various Engineering Purposes (cont.)

Soil Series and Mapping Unit	Local Roads and Streets	Lawns and Landscaping	Septic Tank Absorption Fields	Sewage Lagoon Areas	Area Sanitary Landfill	Daily Cover for Landfill
Rozetta, 279B, 279C2	Severe: low strength, frost action	Slight	Moderate: wetness	Moderate-Severe: seepage, slope, wetness	Moderate: wetness	Fair: too clayey
Sable, 68	Severe: low strength, ponding, frost action	Moderate: wetness, flooding	Severe: ponding	Severe: ponding	Severe: ponding	Poor: hard to pack, ponding
Sawmill, 107[b], 107+	Severe: low strength, wetness, flooding	Moderate: wetness	Severe: flooding, wetness	Severe: wetness, flooding	Severe: flooding, wetness	Poor: wetness
Sylvan, 19C3	Severe: low strength, frost action	Slight	Slight	Severe: slope	Slight	Good
19D3[b]	Severe: low strength, frost action	Slight	Moderate: slope	Severe: slope	Moderate: slope	Fair: slope
19E3[a]	g					
Tama, 36B, 36B2, 36C2	Severe: low strength, frost action	Moderate: slope	Moderate: wetness	Moderate-Severe: seepage, slope, wetness	Moderate: wetness	Fair: too clayey

See footnotes at end of table

APPENDIX F

BIOLOGICAL RESOURCES

Table 1. Mammal species likely to occur within the petition area. Common and scientific names follow Hoffmeister (1989).

Common name*	Scientific Name*
Virginia opossum	*Didelphis virginiana*
northern short-tailed shrew	*Blarina brevicauda*
least shrew	*Cryptotis parva*
eastern mole	*Scalopus aquaticus*
big brown bat	*Eptesicus fuscus*
red bat	*Lasiurus borealis*
hoary bat	*Lasiurus cinereus*
little brown myotis	*Myotis lucifugus*
Keen's myotis	*Myotis keenii*
evening bat	*Nycticeius humeralis*
eastern pipistrelle	*Pipistrellus subflavus*
coyote	*Canis latrans*
red fox	*Vulpes vulpes*
raccoon	*Procyon lotor*
long-tailed weasel	*Mustela frenata*
least weasel	*Mustela nivalis*
mink	*Mustela vison*
badger	*Taxidea taxus*
striped skunk	*Mephitis mephitis*
white-tailed deer	*Odocoileus virginianus*
woodchuck	*Marmota monax*
fox squirrel	*Sciurus niger*
thirteen-lined ground squirrel	*Spermophilus tridecemlineatus*
white-footed mouse	*Peromyscus leucopus*
deer mouse	*Peromyscus maniculatus*
western harvest mouse	*Reithrodontomys megalotis*
prairie vole	*Microtus ochrogaster*
meadow vole	*Microtus pennsylvanicus*
muskrat	*Ondatra zibethicus*
house mouse	*Mus musculus*
Norway rat	*Rattus norvegicus*
meadow jumping mouse	*Zapus hudsonius*
eastern cottontail	*Sylvilagus floridanus*

Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
Red-throated loon	Fulton	a	1983
Common loon	Fulton	a	1981
	Knox	sp	1985,87-88
		a	1983,85-86
		w	1986
Pied-billed grebe**	Fulton	sp	1982-83
		a	1987
	Fulton	sp	1984-85
		br	1983
		a	1983-85
		w	1986
	Peoria	sp	1981,88
		br	1981,84
		w	1984
Horned grebe	Fulton	sp	1982,84,86
	Knox	sp	1984-88
Red-necked grebe	Fulton	sp	1985
Eared grebe	Fulton	a	1987
	Knox	sp	1988
Western grebe	Fulton	a	1985
Double-crested cormorant**	Fulton	sp	1975,78,86,88
		br	1982-84,87
		a	1981,85
	Knox	sp	1985,87
		a	1986
		w	1986
	Peoria	sp	1985-86
		br	1984-85
		a	1984-85
		w	1984
American bittern**	Fulton	sp	1986
		br	1983-85
		a	1983
	Knox	br	1983
	Peoria	sp	1982
		br	1983
		a	1981
Least bittern**	Fulton	sp	1983,88
		br	1985
	Knox	br	1982

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Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
Great blue heron	Fulton	a	1985-87
	Knox	sp	1987
	Peoria	sp	1987
		br	1979-80,82
		a	1980,82-83
		w	1981
Great egret**	Fulton	sp	1981,87-88
		a	1981,85-87
	Knox	sp	1985,87
	Peoria	sp	1982
		br	1980,82,89
		a	1977,80-83,85
Snowy egret**	Fulton	a	1987
	Peoria	sp	1985
		br	1985
		a	1981,84,87
Little blue heron**	Fulton	sp	1983
	Peoria	sp	1977,81,85-88
		br	1985
		a	1978-80,83-85,87
Cattle egret	Fulton	sp	1982,86-87
		a	1982-83,86-87
	Knox	a	1985
	Peoria	sp	1981-83,85,88
		a	1980,85-86
Green-backed heron	Fulton	a	1986
	Knox	sp	1987
	Peoria	br	1984
		a	1984
Black-crowned night-heron**	Fulton	sp	1984
		a	1985,87
	Knox	sp	1984-87
		a	1987
	Peoria	sp	1978,81-82,84-85
		br	1977,1981,1985
		a	1978,80-81,83,87
Yellow-crowned night-heron	Fulton	sp	1983
	Knox	sp	1988
	Peoria	sp	1977-78,81,85-86,88
		br	1981-82,84-85,87
		a	1978,80,84

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Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
Tundra swan	Fulton	sp	1983-84
		a	1986
	Knox	sp	1985
		a	1985
	Peoria	sp	1975
		a	1987
		w	1974
Mute Swan	Fulton	sp	1983-83
		br	1974,84
		a	1981-82
		w	1981-3
	Knox	sp	1983,86-87
		a	1981-82
		w	1982,86
	Peoria	w	1977
Greater white-fronted goose	Fulton	sp	1978,85
		a	1987
		w	1987
	Knox	sp	1976,85
		a	1983,85
Snow goose	Fulton	sp	1983
		a	1985-87
		w	1985-87
	Knox	sp	1984,88
		a	1985,87
		w	1985-86
Canada goose	Fulton	sp	1982,87
		br	1984
		a	1986-87
		w	1985-87
	Knox	sp	1985-88
		br	1983,85,87
		a	1984,85,87
		w	1986-87

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Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
Wood duck	Fulton	br	1983,87
		sp	1988
		w	1985-86
	Knox	sp	1987
		br	1985-86
		a	1982-83
	Peoria	sp	1984
		br	1981
		w	1981
Green-winged teal	Fulton	sp	1987
		a	1985,87
		w	1985
	Knox	sp	1988
		a	1987
	Peoria	a	1987
American blackduck	Fulton	sp	1984
		br	1983
		a	1985
		w	1987
	Knox	br	1985
Mallard	Fulton	sp	1988
		w	1987
	Knox	br	1983,85
		w	1986
Northern pintail	Fulton	sp	1983-84
		a	1987
	Knox	br	1978
	Peoria	sp	1984
Blue-winged teal	Fulton	br	1987
		a	1987
	Knox	sp	1986-87
		a	1985
	Peoria	sp	1988
Cinnamon teal	Fulton	sp	1988
Northern shoveler	Fulton	sp	1986
		a	1985-87
	Knox	sp	1988
	Peoria	sp	1980,84

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Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
American wigeon	Fulton	sp	1983,87
		a	1985
		w	1987
	Knox	a	1985
	Peoria	sp	1984
Canvasback	Fulton	sp	1983,85-86
		w	1980,1985
Redhead	Fulton	sp	1983,86-88
		a	1983
		w	1985
	Peoria	sp	1983
		a	1985
Ring-necked duck	Fulton	sp	1983,85,87-88
		a	1985
		w	1985
	Knox	sp	1987-88
	Peoria	sp	1985
Lesser scaup	Fulton	sp	1983-87
		br	1975
	Knox	sp	1988
		a	1983
		w	1987-88
Greater scaup	Fulton	sp	1988
	Knox	sp	1986-88
Surf scoter	Knox	a	1985-86
Black scoter	Peoria	sp	1975
White-winged scoter	Fulton	a	1980,84,87
	Knox	a	1984,87
	Peoria	sp	1975
		w	1977
Common goldeneye	Peoria	sp	1984
		w	1983
Bufflehead	Peoria	sp	1982
Hooded merganser	Fulton	sp	1981,85-86
		br	1983,85,88
	Knox	sp	1987
		w	1986
	Peoria	sp	1982,85
		br	1981,88
		w	1983

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Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
Common merganser	Fulton	sp	1986-87
		w	1987
	Knox	a	1983
	Peoria	a	1983
		w	1981
Red-breasted merganser	Fulton	sp	1984,87
	Knox	sp	1988
Ruddy duck	Fulton	a	1983,85
		w	1985,87
	Knox	sp	1987
		a	1983
Turkey vulture	Fulton	sp	1983,86
		a	1987
	Knox	sp	1987
		a	1983-84
	Peoria	a	1975,85
Osprey**	Fulton	br	1986
		a	1986-87
	Knox	sp	1985-86
		a	1986-87
	Peoria	br	1982
		a	1974
Bald eagle***	Fulton	sp	1984
		a	1985,87
		w	1983,86
	Knox	sp	1987-88
		a	1985,87
	Peoria	w	1979-89
Northern harrier**	Fulton	sp	1983
		br	1983
		a	1987
	Knox	sp	1985,87
		a	1986-87
		w	1986-88
	Peoria	sp	1987
Sharp-shinned hawk**	Fulton	a	1987
	Knox	a	1985-86
		w	1985
	Peoria	sp	1985
Cooper's hawk**	Knox	a	1983
Northern goshawk	Knox	sp	1983-84

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Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
Red-shouldered hawk**	Fulton	sp	1985
		a	1985
Broad-winged hawk	Fulton	a	1985-87
	Knox	sp	1984,87-88
		a	1983,86
	Peoria	sp	1985
		br	1982
		a	1974
Red-tailed hawk	Knox	sp	1987
		br	1988
		a	1983-84,87
		w	1987-88
	Peoria	br	1981
		a	1974
Rough-legged hawk	Fulton	a	1983
	Knox	sp	1987
		a	1981,85-86
		w	1987-88
Golden eagle	Knox	a	1986
American kestrel	Knox	w	1985-88
	Peoria	w	1984
Merlin	Fulton	a	1987
	Knox	a	1987
	Peoria	a	1986
Peregrine falcon***	Fulton	br	1988
		a	1985-87
	Knox	sp	1987
	Peoria	sp	1986
		br	1987
		a	1981,83,87
Gray partridge	Knox	sp	1987
		a	1987
		w	1987-88
Northern bobwhite	Knox	br	1988
Black rail**	Fulton	br	1983
King rail	Fulton	sp	1986
		br	1983,87-88
	Peoria	sp	1987
		br	1985

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Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
Virginia rail	Fulton	br	1983
	Knox	sp	1988
		a	1983
	Peoria	sp	1984,88
		br	1985
Sora	Fulton	a	1985
	Knox	sp	1984,86-88
		br	1985
		a	1983
	Peoria	br	1985
Common moorhen*	Fulton	sp	1982-84
		a	1982
	Knox	sp	1987
	Peoria	sp	1980
American coot	Fulton	sp	1984
		br	1984
		a	1985
		w	1987
Sandhill crane**	Knox	w	1983-84
	Peoria	sp	1982
Black-bellied plover	Fulton	sp	1988
		a	1985,87
	Peoria	sp	1986
Lesser golden-plover	Fulton	a	1985-87
	Knox	a	1985
	Peoria	sp	1988
		a	1981
Snowy plover	Fulton	sp	1987
Semipalmated plover	Fulton	sp	1988
		a	1987
	Knox	sp	1986
	Peoria	sp	1980,85
		a	1983
Piping plover***	Fulton	a	1987
Killdeer	Fulton	a	1987
	Knox	sp	1984-85,87
		a	1985
	Peoria	sp	1984
		w	1983

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Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
American avocet	Fulton	a	1985-87
	Peoria	a	1978,81
Black-necked stilt	Peoria	sp	1988
Greater yellowlegs	Fulton	a	1985,87
	Knox	sp	1984,86
		a	1983-85,87
	Peoria	sp	1988
		a	1981,85
Lesser yellowlegs	Fulton	sp	1983,88
		a	1985
	Knox	sp	1984,88
		a	1985
	Peoria	sp	1985,87
		a	1982,85
Solitary sandpiper	Fulton	a	1987
	Knox	sp	1987-88
		a	1984,86
	Peoria	a	1984-86
		sp	1985,87
Willet	Fulton	a	1987
	Peoria	sp	1983,86
Spotted sandpiper	Fulton	a	1985
	Knox	sp	1985,88
		br	1983
		a	1985-86
	Peoria	sp	1987-88
		br	1985
Upland sandpiper**	Fulton	br	1980-81,86-87
		a	1985
	Knox	sp	1986-88
		br	1986-87
		a	1985-86
	Peoria	br	1987
		a	1983
Hudsonian godwit	Fulton	sp	1979,87-88
		a	1987
	Peoria	sp	1982,86
Marbled godwit	Fulton	sp	1988
		a	1987
	Knox	sp	1988

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Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
Ruddy turnstone	Fulton	a	1987
	Peoria	sp	1986
		a	1985
Red knot	Fulton	a	1987
	Peoria	a	1978
Sanderling	Fulton	a	1985,87
	Knox	sp	1986,88
	Peoria	sp	1982
		a	1981
Semipalmated sandpiper	Knox	a	1984
	Peoria	sp	1985
		a	1981
Western sandpiper	Knox	sp	1986
	Peoria	sp	1984-85
		a	1981,87
Least sandpiper	Fulton	a	1985,87
	Peoria	a	1981
		w	1981
White-rumped sandpiper	Fulton	sp	1987
	Peoria	sp	1982,84-85
Baird's sandpiper	Fulton	a	1985,87
	Peoria	sp	1984
		a	1985,87
Pectoral sandpiper	Fulton	sp	1987
		a	1985-87
	Knox	sp	1988
		a	1983,85
	Peoria	sp	1987-88
		a	1985
Dunlin	Fulton	a	1985,87
	Knox	sp	1986
		a	1984-85
	Peoria	sp	1985-86
		a	1983
		w	1982
Stilt sandpiper	Fulton	sp	1988
		a	1986-87
	Peoria	sp	1985-86
		a	1981,83-85
Buff-breasted sandpiper	Fulton	a	1985,87
	Peoria	a	1985

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Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
Short-billed dowitcher	Fulton	a	1985
	Knox	a	1985
	Peoria	sp	1983-86
		a	1981
Long-billed dowitcher	Fulton	sp	1983,88
		a	1985,87
	Knox	sp	1988
	Peoria	sp	1984,86
		a	1981
Common snipe	Fulton	br	1983
		a	1987
	Knox	sp	1984,87-88
		w	1985
	Peoria	sp	1988
		a	1983
		w	1984-85
American woodcock	Knox	sp	1984-88
		br	1987
		a	1985
	Peoria	sp	1983-84,87-88
		a	1985
Wilson's phalarope**	Fulton	sp	1987-88
		a	1985,87
	Peoria	sp	1978,83-84,86
		a	1979,85
Red-necked phalarope	Fulton	a	1985-87
	Peoria	a	1981
Red phalarope	Fulton	a	1985
Laughing gull	Fulton	sp	1983,87
		a	1985,87
Franklin's gull	Fulton	a	1985-87
	Peoria	sp	1975,82,86
		a	1981,87
Bonaparte's gull	Fulton	sp	1988
		a	1981,85-87
		w	1987
	Knox	sp	1987
	Peoria	a	1985
Ring-billed gull	Fulton	a	1985,87
	Peoria	sp	1985
		a	1981

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Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
California gull	Fulton	sp	1987
Herring gull	Fulton	a	1986
	Peoria	w	1983
Thayer's gull	Fulton	sp	1987
		a	1985
		w	1987
	Peoria	sp	1986
		w	1981,87-88
Iceland gull	Fulton	sp	1986
		w	1987
	Peoria	w	1981
Glaucous gull	Fulton	sp	1986
		w	1987-88
	Peoria	sp	1987
		w	1977,1980-88
Great black-backed gull	Fulton	sp	1986
		a	1987
		w	1986
	Peoria	sp	1987
		w	1986
Sabine's gull	Fulton	a	1987
Caspian tern	Fulton	a	1986-87
Common tern**	Fulton	sp	1983
		a	1987
	Peoria	sp	1981
Forster's tern**	Fulton	sp	1987
		a	1986
	Knox	sp	1983-84,86-88
	Peoria	sp	1985
		a	1985
Least tern***	Peoria	sp	1986
Black tern**	Fulton	a	1986-87
	Knox	sp	1983,88
	Peoria	sp	1981,83,86
Black-billed cuckoo	Knox	sp	1987
		br	1985
Yellow-billed cuckoo	Fulton	a	1985-87
	Knox	sp	1987
Eastern screech-owl	Knox	br	1988
Great horned owl	Peoria	br	1977

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Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
Snowy owl	Fulton	a	1980,87
		w	1980,87-88
	Knox	w	1980
	Peoria	sp	1981
		a	1980
		w	1980-81
Barred owl	Knox	sp	1984-88
	Peoria	br	1982
		w	1985
Long-eared owl**	Peoria	sp	1984,87
		a	1980
		w	1980-85,87-88
Short-eared owl**	Fulton	br	1981
		w	1984-85
	Knox	sp	1985-86
		a	1986-87
		w	1985-88
	Peoria	w	1984-85
Northern saw-whet owl	Peoria	a	1981
		w	1978-79
Common nighthawk	Knox	sp	1986
		a	1984-85,87
	Peoria	a	1981
Whip-poor-will	Knox	sp	1985-87
Chimney swift	Fulton	sp	1980
	Knox	a	1987
Ruby-throated hummingbird	Fulton	a	1986-87
	Knox	a	1983
Belted kingfisher	Fulton	w	1984-85
	Knox	br	1983
	Peoria	w	1983-84
Yellow-bellied sapsucker	Knox	w	1985-86
Northern flicker	Fulton	a	1986
	Knox	sp	1988
	Peoria	a	1987
Pileated woodpecker	Knox	w	1987-88
Horned lark	Knox	w	1986
Olive-sided flycatcher	Peoria	sp	1988
Eastern wood-pewee	Fulton	a	1987
Acadian flycatcher	Peoria	sp	1984
		br	1981

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Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
Alder flycatcher	Peoria	sp	1987
Willow flycatcher	Knox	br	1988
	Peoria	br	1977,81
Least flycatcher	Knox	sp	1988
Eastern phoebe	Knox	sp	1988
		br	1983
		a	1987
	Peoria	sp	1988
Eastern kingbird	Knox	sp	1986
		br	1985
Western kingbird	Fulton	sp	1984
		br	1984
Purple martin	Knox	sp	1986
Tree swallow	Fulton	sp	1985,87-88
		a	1987
	Knox	sp	1985-86
	Peoria	br	1982
Northern rough-winged swallow	Knox	sp	1983,85,88
Bank swallow	Fulton	a	1987
	Knox	sp	1983,86
		br	1988
	Peoria	br	1981-82
Cliff swallow	Fulton	a	1981,87
	Knox	sp	1983,86-88
		br	1986-88
		a	1983,85,87
Barn swallow	Fulton	a	1987
	Peoria	a	1983
Blue jay	Fulton	a	1986
	Knox	a	1986
Carolina chickadee	Fulton	w	1980-81
Red-breasted nuthatch	Peoria	sp	1982
Brown creeper*	Fulton	br	1983
House wren	Knox	a	1987
Carolina wren	Knox	br	1988
Bewick's wren**	Knox	sp	1987
Winter wren	Knox	sp	1985,88
	Peoria	sp	1986

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Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
Sedge wren	Fulton	br	1984
		a	1984
	Knox	sp	1985-86
		br	1985,87-88
	Peoria	sp	1977
Marsh wren	Knox	sp	1984-85,87
Golden-crowned kinglet	Fulton	a	1986
	Knox	sp	1984,86
		a	1983,85-86
	Peoria	a	1983
Blue-gray gnatcatcher	Knox	sp	1987
		a	1985
Eastern bluebird	Knox	sp	1984,87
		a	1985,87
		w	1983
	Peoria	br	1981-83
Swainson's thrush	Knox	sp	1987
Gray-cheeked thrush	Knox	a	1983
Hermit thrush	Peoria	w	1981-82
Veery*	Knox	br	1988
	Peoria	br	1987
American robin	Peoria	w	1980
Varied thrush	Peoria	w	1979
Gray catbird	Fulton	a	1986
	Knox	a	1985
Brown thrasher	Knox	sp	1987
Northern mockingbird	Knox	sp	1985,87
		br	1988
		a	1983,85
		w	1982,87-88
Water pipit	Fulton	sp	1983
		a	1985,87
	Knox	sp	1988
Cedar waxwing	Knox	sp	1985
		br	1985
		a	1983,85-86
		w	1982-83
Northern shrike	Knox	w	1985-86

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Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
Loggerhead shrike*	Fulton	sp	1983
	Knox	sp	1984,88
		br	1984
		a	1983-85
		w	1986-87
White-eyed vireo	Fulton	sp	1981
	Knox	sp	1983,87-88
		br	1986-87
	Peoria	sp	1982,87
		br	1982,87
		a	1987
Bell's vireo	Fulton	sp	1988
	Knox	sp	1984,86
		br	1983,86,88
	Peoria	sp	1981,84
Solitary vireo	Knox	a	1982,85
	Peoria	a	1974
Yellow-throated vireo	Knox	sp	1986-87
	Peoria	sp	1987
		a	1981
Philadelphia vireo	Peoria	sp	1987
Warbling vireo	Knox	a	1985
	Peoria	br	1981
Red-eyed vireo	Knox	a	1983
Blue-winged warbler	Knox	sp	1985,87-88
		br	1988
	Peoria	br	1982,87
Golden-winged warbler	Peoria	sp	1986
Tennessee warbler	Fulton	a	1987
	Knox	sp	1987
	Peoria	a	1987
Orange-crowned warbler	Fulton	a	1986
	Knox	sp	1986
		a	1985
	Peoria	sp	1981
Nashville warbler	Fulton	a	1986
	Knox	sp	1985
Yellow warbler	Knox	sp	1984,86-87
	Peoria	br	1981

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Table 2 continued

Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
Chestnut-sided warbler	Fulton	a	1987
	Knox	sp	1983,87
		a	1983
Magnolia warbler	Fulton	a	1987
Cape may warbler	Knox	a	1986
Black-throated blue warbler	Knox	a	1984
Yellow-rumped warbler	Knox	sp	1983
		a	1983
Black-throated green warbler	Fulton	a	1974,87
	Knox	a	1982,84
	Peoria	sp	1984
Blackburnian warbler	Fulton	a	1985,87
	Knox	sp	1983
	Peoria	a	1987
Pine warbler	Fulton	sp	1987
	Knox	sp	1988
Priaire warbler	Knox	sp	1986
	Peoria	br	1978,82
Palm warbler	Knox	sp	1983-84,86
		sp	1983
	Peoria	w	1974
Bay-breasted warbler	Fulton	a	1985,87
	Peoria	a	1987
Blackpoll warbler	Knox	a	1985
Cerulean warbler	Knox	sp	1987-88
		br	1986-88
Black-and-white warbler	Fulton	a	1986-87
	Knox	sp	1985
		br	1988
American redstart	Fulton	a	1986-87
	Knox	br	1988
		a	1985,87
	Peoria	br	1985
		a	1987
Prothonotary warbler	Fulton	br	1983
		a	1985
	Knox	br	1988
Worm-eating warbler	Knox	sp	1984-85,88
	Peoria	sp	1982-87
		a	1982

table continued on the next page

Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
Ovenbird	Knox	br	1983,87-88
	Peoria	br	1987
Northern waterthrush	Knox	sp	1986-87
		a	1983
Louisiana waterthrush	Knox	sp	1984,87-88
		br	1987-88
	Peoria	sp	1987-88
Kentucky warbler	Knox	sp	1988
		br	1987-88
	Peoria	sp	1985
		br	1987
		a	1987
Connecticut warbler	Knox	sp	1986,88
	Peoria	sp	1981-84,86,88
Mourning warbler	Knox	sp	1986
Hooded warbler	Knox	br	1986
	Peoria	sp	1982,84-85
		br	1987
		a	1987
Wilson's warbler	Fulton	a	1986
Canada warbler	Knox	a	1983
	Peoria	sp	1987
Common yellowthroat	Knox	sp	1986
Yellow-breated chat	Knox	sp	1987-88
		br	1983,86-87
	Peoria	sp	1984
Summer tanager	Knox	br	1983,87
Scarlet tanager	Knox	sp	1988
	Peoria	sp	1981,84,86
Rose-breasted grosbeak	Knox	sp	1984,86
		a	1982,87
	Peoria	sp	1986
Blue grosbeak	Knox	sp	1986
		br	1986
Indigo bunting	Fulton	a	1985
	Knox	sp	1986-88
		br	1985
Dickcissel	Fulton	br	1983
	Knox	sp	1987
		br	1983,85

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Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
American tree sparrow	Knox	sp	1988
		a	1987
		w	1985
Chipping sparrow	Knox	sp	1988
		a	1983
Clay-colored sparrow**	Peoria	sp	1981,86
Field sparrow	Knox	sp	1987
		br	1986
	Peoria	br	1981
Vesper sparrow	Fulton	a	1987
	Knox	sp	1987
		br	1983,86,88
Lark sparrow	Knox	sp	1987
		br	1983,85-86
Savannah sparrow	Knox	w	1986
Grasshopper sparrow	Fulton	sp	1985
	Knox	sp	1987-88
		br	1985
	Peoria	sp	1984
Henslow's sparrow*	Fulton	br	1978
	Knox	sp	1986
LeConte's sparrow	Fulton	sp	1983,88
		a	1985,87
	Peoria	sp	1984
Fox sparrow	Knox	sp	1984
		a	1983-84
	Peoria	sp	1982
		w	1980-82
Lincoln's sparrow	Knox	a	1986
Swamp sparrow	Knox	w	1985-86
White-throated sparrow	Knox	sp	1984
		a	1983
		w	1985-88
White-crowned sparrow	Knox	sp	1982
		a	1983,85
		w	1983-86
	Peoria	w	1983-85
Sharp-tailed sparrow	Fulton	sp	1983
		a	1987

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Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
Harris' sparrow	Fulton	sp	1983
	Knox	a	1985
	Peoria	a	1981
Dark-eyed junco	Knox	w	1985
	Peoria	sp	1984
Lapland longspur	Fulton	a	1985
	Knox	sp	1983,85,87-88
		a	1983-86
		w	1982-83,85,87-88
	Peoria	sp	1988
		a	1981
Smith's longspur	Fulton	sp	1985
	Knox	sp	1985,87
Snow bunting	Knox	a	1985
		w	1983
Bobolink	Fulton	sp	1983
		a	1986
	Knox	br	1984-86
		a	1985
	Peoria	br	1978,81
Eastern meadowlark	Knox	sp	1984
		br	1983
	Peoria	br	1983
Western meadowlark	Knox	sp	1986-87
		a	1987
		w	1987-88
	Peoria	sp	1986
Rusty blackbird	Fulton	sp	1987
	Knox	sp	1984
	Peoria	w	1980
Brewer's blackbird*	Fulton	sp	1988
	Knox	sp	1987-88
	Peoria	sp	1982
Orchard oriole	Peoria	br	1981
Northern oriole	Knox	sp	1986
		a	1987
Purple finch	Fulton	w	1981-82
	Knox	sp	1983,88
		a	1982
	Peoria	sp	1984

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Table 2 concluded

Table 2. A summary of bird species recorded in Fulton, Knox, and Peoria counties, Illinois, during the past sixteen years. These species have potential to occur within the petition area at certain times of the year.

Species	County	Season	Year
House finch	Fulton	sp	1987
		a	1986
	Knox	sp	1986-87
		br	1987
	Peoria	sp	1987
		a	1987
		w	1987
Red crossbill	Knox	a	1987
	Peoria	a	1981
White-winged crossbill	Peoria	w	1981-82
Common redpoll	Fulton	sp	1982
	Knox	sp	1988
		w	1985
	Peoria	a	1981
		w	1987
Pine siskin	Fulton	sp	1984
		a	1986
	Knox	sp	1984,86
		a	1985-86
	Peoria	a	1981
		w	1981
Evening grosbeak	Fulton	w	1985-86
	Knox	sp	1987
		w	1983-84
	Peoria	sp	1982,84
		a	1974
		w	1981,83
Eurasian tree sparrow	Fulton	br	1985
		a	1986
		w	1985-86
Ringed-turtle dove	Knox	sp	1987

*** = federally endangered species
** = state endangered species
* = state threatened species
Data in this table taken from the IFWIS database (IHNS)

Table 3. Breeding status of bird species observed within Breeding Bird Atlas blocks during 1986 through 1988 surveys which are contained in a one quad buffer zone around the petition area.

Species	1986	1987	1988
Great blue heron	OB	PO	PO
Great egret**	OB	PO	----
Green-backed heron	PO	PO	PR
Black-crowned night-heron**	OB	----	----
Canada goose	PR	PR	CO
Wood duck	----	----	CO
Mallard	PR	CO	CO
Turkey vulture	PO	PO	PO
Northern harrier**	OB	----	----
Cooper's hawk**	OB	----	----
Red tailed hawk	PO	PO	PR
American kestrel	PR	CO	PO
Ring-necked pheasant	PO	PO	PR
Northern bobwhite	PR	CO	PR
American coot	OB	----	----
Killdeer	CO	CO	PR
Spotted sandpiper	----	----	PO
American woodcock	OB	----	PR
Rock dove	CO	PO	PO
Mourning dove	PR	CO	CO
Black-billed cuckoo	PO	----	----
Yellow-billed cuckoo	PO	OB	PR
Eastern screech-owl	OB	----	PR
Great horned owl	PO	OB	PR
Barred owl	PO	----	PR
Common nighthawk	PO	----	PR
Whip-poor-will	PR	----	PR
Chimney swift	PR	PO	PO
Ruby-throated hummingbird	PR	OB	----
Belted kingfisher	PO	PR	PR
Red-headed woodpecker	CO	CO	CO
Red-bellied woodpecker	PO	----	CO
Downy woodpecker	PR	PR	CO
Hairy woodpecker	PO	PO	PR
Northern flicker	PR	CO	CO
Eastern wood-pewee	PR	PO	PR
Acadian flycatcher	----	----	PO
Willow flycatcher	----	PO	----
Eastern phoebe	PR	CO	CO

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Table 3 continued

Table 3. Breeding status of bird species observed within Breeding Bird Atlas blocks during 1986 through 1988 surveys which are contained in a one quad buffer zone around the petition area.

Species	1986	1987	1988
Great crested flycatcher	PO	PO	PR
Eastern kingbird	CO	CO	PR
Horned lark	CO	PR	CO
Purple martin	CO	CO	CO
Tree swallow	----	----	PR
Northern rough-winged swallow	CO	PR	CO
Barn swallow	CO	CO	CO
Blue jay	CO	PO	CO
American crow	PR	OB	PO
Black-capped chickadee	CO	PO	PR
Tufted titmouse	PO	PO	CO
White-breasted nuthatch	PR	OB	CO
Brown creeper*	PO	----	----
Carolina wren	PO	----	PO
House wren	CO	CO	PR
Blue-gray gnatcatcher	----	----	PR
Eastern bluebird	CO	OB	CO
Wood thrush	PR	----	PR
American robin	CO	CO	CO
Gray catbird	CO	PO	CO
Northern mockingbird	----	OB	PR
Brown thrasher	CO	PO	CO
Cedar waxwing	PO	CO	PR
European starling	CO	CO	CO
White-eyed vireo	----	----	PO
Bell's vireo	OB	----	----
Yellow-throated vireo	OB	----	PR
Warbling vireo	PO	PR	PR
Red-eyed vireo	PO	----	PR
Blue-winged warbler	PO	----	----
Yellow warbler	PO	PO	PR
American redstart	OB	----	----
Ovenbird	PO	----	----
Kentucky warbler	----	----	PO
Common yellowthroat	PR	PR	PR
Yellow-breasted chat	PO	----	PO
Scarlet tanager	PO	----	PO
Northern cardinal	CO	PR	PR
Rose-breasted grosbeak	CO	CO	PR

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Table 3. **Breeding** status of bird species observed within Breeding Bird Atlas blocks during 1986 through 1988 surveys which are contained in a one quad buffer zone around the petition area.

Species	1986	1987	1988
Indigo bunting	PR	PR	PR
Dickcissel	PR	PR	PR
Rufous-sided towhee	PR	PO	PR
Chipping sparrow	CO	PO	PR
Field sparrow	CO	----	PR
Vesper sparrow	OB	----	PR
Lark sparrow	CO	----	CO
Savannah sparrow	----	----	PO
Grasshopper sparrow	PR	PO	PO
Song sparrow	CO	CO	PR
Swamp sparrow	OB	----	----
Red-winged blackbird	CO	CO	CO
Easterm meadowlark	CO	CO	PR
Common grackle	CO	CO	CO
Brown-headed cowbird	CO	PR	PR
Orchard oriole	PO	----	PO
Northern oriole	CO	CO	CO
American goldfinch	PR	PR	PR
House sparrow	CO	CO	CO

Breeding confirmation codes: OB = observed within atlas block
PO = possible breeding within atlas block
PR = probable breeding within atlas block
CO = confirmed breeding within atlas block

** = state endangered species
* = state threatened species

Data in this table taken from the Illinois Breeding Bird Atlas database (IDOC).

Table 4. Species of reptiles and amphibians that could occur within the petition area. Common and scientific names follow Morris et al. (1983). Abundance of each species (C=common, R=rare) state-wide is based on Smith (1961).

Common name	Scientific name	Abundance
Amphibians		
smallmouth salamander	*Ambystoma texanum*	C
tiger salamander	*Ambystoma tigrinum*	C
mudpuppy	*Necturus maculosus*	C
American toad	*Bufo americanus*	C
northern cricket frog	*Acris crepitans*	C
striped chorus frog	*Pseudacris triseriata*	C
gray treefrog	*Hyla versicolor* *	C
bullfrog	*Rana catesbeiana*	C
northern leopard frog	*Rana pipiens*	C
plains leopard frog	*Rana blairi*	R
Reptiles		
snapping turtle	*Chelydra serpentina*	C
stinkpot	*Sternotherus odoratus*	C
painted turtle	*Chrysemys picta*	C
pond slider	*Pseudemys scripta*	C
spiny softshell turtle	*Trionyx spiniferus*	C
slender glass lizard	*Ophisaurus attenuatus*	R
five-lined skink	*Eumeces fasciatus*	C
eastern hognose snake	*Heterodon platyrhinos*	C
smooth green snake	*Opheodrys vernalis*	R
racer	*Coluber constrictor*	C
fox snake	*Elaphe vulpina*	C
bullsnake	*Pituophis melanoleucus*	C
prairie kingsnake	*Lampropeltis calligaster*	C
milk snake	*Lampropeltis triangulum*	R
plains garter snake	*Thamnophis radix*	C
common garter snake	*Thamnophis sirtalis*	C
brown snake	*Storeria dekayi*	C
redbelly snake	*Storeria occipitomaculata*	R
Graham's crayfish snake	*Regina grahami*	C
northern water snake	*Nerodia sipedon*	C
massasauga	*Sistrurus catenatus*	R

* A composite range is shown for the sibling species *Hyla versicolor* and *H. chrysocelis* (Conant 1975).

Table 5

Locations of fish collections made by INHS ichthyologists and IDOC fisheries biologists from streams (excluding the Spoon River main channel) draining the Galesburg section of the Western Forest-Prairie Division in Knox, Fulton, and Peoria counties.

1. Knox Co., Cadwell Creek, 2 mi. N. Williamsfield. T.11N, R.4E, Sec. 11. 2 July 1968.
2. Knox Co., Pine Creek, 1.5 mi. NW Williamsfield. T.11N, R.4E, Sec. 15. 13 July 1964.
3. Knox Co., Court Creek, 1.5 mi. W Dahinda. T.11N, R.3E, Sec. 22. 8 July 1964.
4. Knox Co., Middle Creek, 4 mi. NE Knoxville. T.11N, R.2E, Sec. 13. 2 July 1968.
5. Knox Co., Pigeon Hollow, 5 mi. E Gilson. T.10N, R.3E, Sec. 13. 4 June 1972.
6. Knox Co., French Creek, 3 mi. E Maquon. T.10N, R.3E, Sec. 36. 13 July 1964.
7. Knox Co., Littlers Creek, 2.5 mi. N Rapatee. T.9N, R.3E, Sec. 22. 14 July 1964.
8. Knox Co., Haw Creek, 3.5 mi. WNW Maquon. T.10N, R.2E, Sec. 36. 2 July 1968.
9. Knox Co., Haw Creek, 3.5 mi. W Maquon. T.9N, R.2E, Sec. 2. 14 July 1964.
10. Knox Co., Brush Creek, 3 mi. NE Abingdon. T.10N, R.1E, Sec. 24. 2 July 1968.
11. Fulton Co., Coal Creek, 2 mi. NE Ellisville. T.8N, R.2 E, Sec. 28. 15 July 1964.
12. Fulton Co., Turkey Creek, 1.5 mi. S Fairview. T.7N, R.3E, Sec. 4. 23 Nov. 1962.
13. Fulton Co., Lost Grove Creek, 1.5 mi. N Fiatt. T.7N, R.3E, Sec. 21. 23 Nov. 1962.
14. Fulton Co., Turkey Creek, 0.8 mi. NE Blyton. T.7N, R.2E, Sec. 22. 3 July 1968.
15. Fulton Co., Copperas Creek, Banner. T.6N, R.5E, Sec. 11. 24 June 1959.
16. Fulton Co., Copperas Creek, Banner. T.6N, R.5E, Sec. 11. 14 July 1964.
17. Fulton Co., Big Creek, 2.5 mi. WSW Bryant. T.6N, R.3E, Sec. 35. 20 July 1964.
18. Fulton Co., Put Creek, 3 mi. E Blyton. T.6N, R.2E, Sec. 4. 20 July 1964.
19. Fulton Co., Shaw Creek, 2.5 mi. NE Marietta. T.6N, R.1E, Sec. 13. 3 July 1968.
20. Fulton Co., Buckheart Creek, 2 mi. NNE Liverpool. T.5N, R.4E, Sec. 12. 6 May 1980.
21. Fulton Co., Buckheart Creek, 1 mi. SE Maples Mill. T.5N, R.4E, Sec. 13. 14 July 1964.
22. Fulton Co., Big Sister Creek, 2.5 mi. WNW Liverpool. T.5N, R.4E, Sec. 21. 24 June 1959.
23. Fulton Co., Francis Creek, 0.2 mi. NE Table Grove. T.5N, R.1E, Sec. 32. 11 March 1972.
24. Fulton Co., Francis Creek, 0.2 mi. NE Table Grove. T.5N, R.1E, Sec. 32. 22 August 1972.

25. Fulton Co., Otter Creek, 2.5 mi. NE Summum. T.4N, R.2E, Sec. 36. 22 June 1966.

26. Peoria Co., Jubilee Creek, 2.5 mi. NW Jubilee. T.10N, R.6E, Sec. 26. 6 July 1967.

27. Peoria Co., Kickapoo Creek, 0.5 mi. S Jubilee. T.10N, R.6E, Sec. 36. 17 March 1961.

28. Peoria Co., Kickapoo Creek, 3 mi. S Kickapoo. T.9N, R.7E, Sec. 30. 21 July 1962.

29. Peoria Co., West Fork Kickapoo Creek, 1.5 mi. E Oak Hill. T.9N, R.6E, Sec. 5. 6 July 1967.

30. Peoria Co., Clarks Branch, 1.5 mi. SW Oak Hill. T.9N, R.5E, Sec. 11. 9 July 1968.

31. Peoria Co., Kickapoo Creek, 1 mi. S Pottstown. T.8N, R.7E, Sec. 1. 17 March 1961.

32. Peoria Co., West Branch Lamarsh Creek, 3 mi. SE Smithville. T.8N, R.7E, Sec. 32. 7 May 1971.

33. Peoria Co., West Branch Lamarsh Creek, 2.5 mi. W Orchard Mines. T.7N, R.7E, Sec. 8. 7 July 1967.

34. Peoria Co., East Branch, Copperas Creek, 2.5 mi. NW Glasford. T.7N, R.6E, Sec. 18. 7 July 1967.

Table 6. Fish species likely to occur in the streams draining the petition area.

Common name	Scientific Name
Creek chub	*Semotilus atromaculatus*
Central stoneroller	*Campostoma anomalum*
Bigmouth shiner	*Hybopsis dorsalis*
Red shiner	*Cyprinella lutrensis*
Sand shiner	*Notropis ludibundus*
Striped shiner	*Luxilus chrysocephalus*
Suckermouth minnow	*Phenacobius mirabilis*
Bluntnose minnow	*Pimephales notatus*
Fathead minnow	*P. promelas*
Quillback	*Carpiodes cyprinus*
White sucker	*Catostomus commersoni*
Yellow bullhead	*Ameiurus natalis*
Largemouth	*Micropterus salmoides*
Green sunfish	*Lepomis cyanellus*
Bluegill	*L. macrochirus*
Fantail darter	*Etheostoma flabellare*
Johnny darter	*E. nigrum*
Orangethroat darter	*E. spectabile*

APPENDIX G

PRODUCTION AND RESERVES OF COAL

Sources: Illinois Department of Mines and Minerals, Coal Report of Illinois (relevant years).

Colin G. Treworgy, Lawrence E. Bengal and Amy G. Dingwell, Reserves and Resources of Surface-Minable Coal in Illinois, Illinois State Geological Survey Circular 504, 1978, appendix 2, Pp. 21-33.

Bureau County Coal Production:
1975 - 1989: All Coal

	Year	Total Production	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
July - Dec.	1975	---	---	---	---	---
	1976	---	---	---	---	---
	1977	---	---	---	---	---
	1978	---	---	---	---	---
	1979	---	---	---	---	---
	1980	---	---	---	---	---
	1981	---	---	---	---	---
	1982	---	---	---	---	---
	1983	---	---	---	---	---
	1984	---	---	---	---	---
	1985	---	---	---	---	---
	1986	---	---	---	---	---
	1987	---	---	---	---	---
	1988	---	---	---	---	---
	1989	---	---	---	---	---
	TOTAL	---	---	---	---	---
	Stripped Reserves	---	---	---	---	---

Bureau County Coal Production:
1975 - 1989: No. 5 and No. 6 Coal

	Year	Total Production	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
July - Dec.	1975	---	---	---	---	---
	1976	---	---	---	---	---
	1977	---	---	---	---	---
	1978	---	---	---	---	---
	1979	---	---	---	---	---
	1980	---	---	---	---	---
	1981	---	---	---	---	---
	1982	---	---	---	---	---
	1983	---	---	---	---	---
	1984	---	---	---	---	---
	1985	---	---	---	---	---
	1986	---	---	---	---	---
	1987	---	---	---	---	---
	1988	---	---	---	---	---
	1989	---	---	---	---	---
	TOTAL	---	---	---	---	---
	Stripped Reserves	---	---	---	---	---

Production = 80% of stripped reserves

Fulton County Coal Production:
1975 - 1989: All Coal

	Year	Total Production	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
July - Dec.	1975	1,243,541	6,000	676,435	---	561,106
	1976	2,888,718	---	743,524	1,089,195	1,055,999
	1977	2,759,200	---	---	1,688,162	1,071,038
	1978	2,457,659	---	---	741,938	1,715,721
	1979	2,798,341	---	---	1,091,572	1,706,769
	1980	2,803,112	---	1,265,034	530,400	1,007,678
	1981	2,129,582	---	---	1,000,003	1,129,579
	1982	2,255,407	---	---	917,011	1,338,396
	1983	2,318,395	---	---	---	2,318,395
	1984	1,063,545	---	---	---	1,063,545
	1985	583,322	---	---	---	583,322
	1986	595,952	---	---	---	595,952
	1987	625,905	---	---	---	625,905
	1988	440,243	---	---	---	440,243
	1989	57,737	---	---	---	57,737
	TOTAL	25,020,659 (25.02)	6,000 (0.01)	2,684,993 (2.68)	7,058,281 (7.06)	15,271,385 (15.27)
	Stripped Reserves	31,275,823 (31.28)	7,500 (0.01)	3,356,241 (3.36)	8,822,851 (8.82)	19,089,231 (19.09)

Fulton County Coal Production:
1975 - 1989: No. 5 and No. 6 Coal

	Year	Total Production	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
July - Dec.	1975	960,828	6,000	393,722	---	561,106
	1976	2,145,194	---	743,524	345,671	1,055,999
	1977	2,200,009	---	---	1,128,971	1,071,038
	1978	1,715,721	---	---	---	1,715,721
	1979	1,706,769	---	---	---	1,706,769
	1980	1,538,078	---	---	530,400	1,007,678
	1981	1,129,579	---	---	---	1,129,579
	1982	1,338,396	---	---	---	1,338,396
	1983	1,334,066	---	---	---	1,334,066
	1984	1,063,545	---	---	---	1,063,545
	1985	583,322	---	---	---	583,322
	1986	595,952	---	---	---	595,952
	1987	625,905	---	---	---	625,905
	1988	440,243	---	---	---	440,243
	1989	57,737	---	---	---	57,737
	TOTAL	17,435,344 (17.44)	6,000 (0.01)	1,137,246 (1.14)	2,005,042 (2.01)	14,287,056 (14.29)
	Stripped Reserves	21,794,180 (21.79)	7,500 (0.01)	1,421,558 (1.42)	2,506,303 (2.51)	17,858,820 (17.86)

Production = 80% of stripped reserves

Numbers in parentheses = Million tons of coal

Henry County Coal Production:
1975 - 1989: All Coal

	Year	Total Production	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
July - Dec.	1975	---	---	---	---	---
	1976	---	---	---	---	---
	1977	---	---	---	---	---
	1978	---	---	---	---	---
	1979	---	---	---	---	---
	1980	---	---	---	---	---
	1981	---	---	---	---	---
	1982	---	---	---	---	---
	1983	---	---	---	---	---
	1984	---	---	---	---	---
	1985	---	---	---	---	---
	1986	---	---	---	---	---
	1987	---	---	---	---	---
	1988	---	---	---	---	---
	1989	---	---	---	---	---
	TOTAL	---	---	---	---	---
	Stripped Reserves	---	---	---	---	---

Henry County Coal Production:
1975 - 1989: No. 5 and No. 6 Coal

	Year	Total Production	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
July - Dec.	1975	---	---	---	---	---
	1976	---	---	---	---	---
	1977	---	---	---	---	---
	1978	---	---	---	---	---
	1979	---	---	---	---	---
	1980	---	---	---	---	---
	1981	---	---	---	---	---
	1982	---	---	---	---	---
	1983	---	---	---	---	---
	1984	---	---	---	---	---
	1985	---	---	---	---	---
	1986	---	---	---	---	---
	1987	---	---	---	---	---
	1988	---	---	---	---	---
	1989	---	---	---	---	---
	TOTAL	---	---	---	---	---
	Stripped Reserves	---	---	---	---	---

Production = 80% of stripped reserves

Knox County Coal Production:
1975 - 1989: All Coal

	Year	Total Production	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
July - Dec.	1975	632,656	---	632,656	---	---
	1976	1,534,248	---	1,534,248	---	---
	1977	1,151,893	---	1,151,893	---	---
	1978	745,401	---	745,401	---	---
	1979	809,283	---	809,283	---	---
	1980	269,743	---	269,743	---	---
	1981	---	---	---	---	---
	1982	---	---	---	---	---
	1983	---	---	---	---	---
	1984	---	---	---	---	---
	1985	---	---	---	---	---
	1986	---	---	---	---	---
	1987	---	---	---	---	---
	1988	66,327	---	---	---	66,327
	1989	446,268	---	---	---	446,268
	TOTAL	5,655,819 (5.66)	---	5,143,224 (5.14)	---	512,595 (0.51)
	Stripped Reserves	7,069,774 (7.07)	---	6,429,030 (6.43)	---	640,744 (0.64)

Knox County Coal Production:
1975 - 1989: No. 5 and No. 6 Coal

	Year	Total Production	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
July - Dec.	1975	632,656	---	632,656	---	---
	1976	1,534,248	---	1,534,248	---	---
	1977	1,151,893	---	1,151,893	---	---
	1978	745,401	---	745,401	---	---
	1979	809,283	---	809,283	---	---
	1980	269,743	---	269,743	---	---
	1981	---	---	---	---	---
	1982	---	---	---	---	---
	1983	---	---	---	---	---
	1984	---	---	---	---	---
	1985	---	---	---	---	---
	1986	---	---	---	---	---
	1987	---	---	---	---	---
	1988	66,327	---	---	---	66,327
	1989	446,268	---	---	---	446,268
	TOTAL	5,655,819 (5.66)	---	5,143,224 (5.14)	---	512,595 (0.51)
	Stripped Reserves	7,069,774 (7.07)	---	6,429,030 (6.43)	---	640,744 (0.64)

Production = 80% of stripped reserves

Numbers in parentheses = Million tons of coal

McDonough County Coal Production:
1975 - 1989: All Coal

	Year	Total Production	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
July - Dec.	1975	---	---	---	---	---
	1976	---	---	---	---	---
	1977	---	---	---	---	---
	1978	---	---	---	---	---
	1979	---	---	---	---	---
	1980	---	---	---	---	---
	1981	---	---	---	---	---
	1982	283,428	283,428	---	---	---
	1983	498,296	498,296	---	---	---
	1984	487,367	487,367	---	---	---
	1985	532,127	---	532,127	---	---
	1986	480,450	---	---	480,450	---
	1987	456,988	---	---	456,988	---
	1988	490,101	---	---	490,101	---
	1989	515,813	---	515,813	---	---
	TOTAL	3,744,570 (3.74)	1,269,091 (1.27)	1,047,940 (1.05)	1,427,539 (1.43)	---
	Stripped Reserves	4,680,713 (4.68)	1,586,364 (1.59)	1,309,925 (1.31)	1,784,424 (1.78)	---

McDonough County Coal Production:
1975 - 1989: No. 5 and No. 6 Coal

	Year	Total Production	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
July - Dec.	1975	---	---	---	---	---
	1976	---	---	---	---	---
	1977	---	---	---	---	---
	1978	---	---	---	---	---
	1979	---	---	---	---	---
	1980	---	---	---	---	---
	1981	---	---	---	---	---
	1982	---	---	---	---	---
	1983	---	---	---	---	---
	1984	---	---	---	---	---
	1985	---	---	---	---	---
	1986	---	---	---	---	---
	1987	---	---	---	---	---
	1988	---	---	---	---	---
	1989	---	---	---	---	---
	TOTAL	---	---	---	---	---
	Stripped Reserves	---	---	---	---	---

Production = 80% of stripped reserves

Numbers in parentheses = Million tons of coal

Peoria County Coal Production:
1975 - 1989: All Coal

	Year	Total Production	0 - 50	50 - 60	50 - 75	50 - 100
				Feet of Overburden		
July - Dec.	1975	347,896	---	---	---	347,896
	1976	716,653	---	---	---	716,653
	1977	917,492	---	---	---	917,492
	1978	590,726	---	590,726	---	---
	1979	615,453	---	---	615,453	---
	1980	476,325	---	476,325	---	---
	1981	425,041	---	---	425,041	---
	1982	502,580	---	---	502,580	---
	1983	533,618	---	---	533,618	---
	1984	393,492	---	---	393,492	---
	1985	---	---	---	---	---
	1986	---	---	---	---	---
	1987	---	---	---	---	---
	1988	---	---	---	---	---
	1989	---	---	---	---	---
	TOTAL	5,519,276 (5.52)	---	1,067,051 (1.07)	2,470,184 (2.47)	1,982,041 (1.98)
	Stripped Reserves	6,899,095 (6.90)	---	1,333,814 (1.33)	3,087,730 (3.09)	2,477,551 (2.48)

Peoria County Coal Production:
1975 - 1989: No. 5 and No. 6 Coal

	Year	Total Production	0 - 50	50 - 60	50 - 75	50 - 100
				Feet of Overburden		
July - Dec.	1975	347,896	---	---	---	347,896
	1976	716,653	---	---	---	716,653
	1977	917,492	---	---	---	917,492
	1978	590,726	---	590,726	---	---
	1979	615,453	---	---	615,453	---
	1980	476,325	---	476,325	---	---
	1981	425,041	---	---	425,041	---
	1982	502,580	---	---	502,580	---
	1983	533,618	---	---	533,618	---
	1984	393,492	---	---	393,492	---
	1985	---	---	---	---	---
	1986	---	---	---	---	---
	1987	---	---	---	---	---
	1988	---	---	---	---	---
	1989	---	---	---	---	---
	TOTAL	5,519,276 (5.52)	---	1,067,051 (1.07)	2,470,184 (2.47)	1,982,041 (1.98)
	Stripped Reserves	6,899,095 (6.90)	---	1,333,814 (1.33)	3,087,730 (3.09)	2,477,551 (2.48)

Production = 80% of stripped reserves

Numbers in parentheses = Million tons of coal

Schuyler County Coal Production:
1975 - 1989: All Coal

	Year	Total Production	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
July - Dec.	1975	---	---	---	---	---
	1976	---	---	---	---	---
	1977	---	---	---	---	---
	1978	---	---	---	---	---
	1979	---	---	---	---	---
	1980	---	---	---	---	---
	1981	---	---	---	---	---
	1982	---	---	---	---	---
	1983	---	---	---	---	---
	1984	---	---	---	---	---
	1985	296,802	296,802	---	---	---
	1986	685,044	685,044	---	---	---
	1987	762,704	762,704	---	---	---
	1988	796,289	796,289	---	---	---
	1989	552,269	552,269	---	---	---
	TOTAL	3,093,108 (3.09)	3,093,108 (3.09)	---	---	---
	Stripped Reserves	3,866,385 (3.87)	3,866,385 (3.87)	---	---	---

Schuyler County Coal Production:
1975 - 1989: No. 5 and No. 6 Coal

	Year	Total Production	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
July - Dec.	1975	---	---	---	---	---
	1976	---	---	---	---	---
	1977	---	---	---	---	---
	1978	---	---	---	---	---
	1979	---	---	---	---	---
	1980	---	---	---	---	---
	1981	---	---	---	---	---
	1982	---	---	---	---	---
	1983	---	---	---	---	---
	1984	---	---	---	---	---
	1985	---	---	---	---	---
	1986	---	---	---	---	---
	1987	---	---	---	---	---
	1988	---	---	---	---	---
	1989					
	TOTAL	---	---	---	---	---
	Stripped Reserves	---	---	---	---	---

Production = 80% of stripped reserves

Numbers in parentheses = Million tons of coal

Stark County Coal Production:
1975 - 1989: All Coal

	Year	Total Production	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
July - Dec.	1975	137,529	---	---	---	137,529
	1976	298,187	---	---	---	298,187
	1977	110,187	---	---	---	110,187
	1978	---	---	---	---	---
	1979	---	---	---	---	---
	1980	---	---	---	---	---
	1981	---	---	---	---	---
	1982	---	---	---	---	---
	1983	---	---	---	---	---
	1984	---	---	---	---	---
	1985	---	---	---	---	---
	1986	---	---	---	---	---
	1987	---	---	---	---	---
	1988	---	---	---	---	---
	1989	---	---	---	---	---
	TOTAL	545,903 (0.55)	---	---	---	545,903 (0.55)
	Stripped Reserves	682,379 (0.68)	---	---	---	682,379 (0.68)

Stark County Coal Production:
1975 - 1989: No. 5 and No. 6 Coal

	Year	Total Production	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
July - Dec.	1975	137,529	---	---	---	137,529
	1976	298,187	---	---	---	298,187
	1977	110,187	---	---	---	110,187
	1978	---	---	---	---	---
	1979	---	---	---	---	---
	1980	---	---	---	---	---
	1981	---	---	---	---	---
	1982	---	---	---	---	---
	1983	---	---	---	---	---
	1984	---	---	---	---	---
	1985	---	---	---	---	---
	1986	---	---	---	---	---
	1987	---	---	---	---	---
	1988	---	---	---	---	---
	1989	---	---	---	---	---
	TOTAL	545,903 (0.55)	---	---	---	545,903 (0.55)
	Stripped Reserves	682,379 (0.68)	---	---	---	682,379 (0.68)

Production = 80% of stripped reserves

Numbers in parentheses = Million tons of coal

Warren County Coal Production:
1975 - 1989: All Coal

	Year	Total Production	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
July - Dec.	1975	---	---	---	---	---
	1976	---	---	---	---	---
	1977	---	---	---	---	---
	1978	---	---	---	---	---
	1979	---	---	---	---	---
	1980	---	---	---	---	---
	1981	---	---	---	---	---
	1982	---	---	---	---	---
	1983	---	---	---	---	---
	1984	---	---	---	---	---
	1985	---	---	---	---	---
	1986	---	---	---	---	---
	1987	---	---	---	---	---
	1988	---	---	---	---	---
	1989	---	---	---	---	---
	TOTAL	---	---	---	---	---
	Stripped Reserves	---	---	---	---	---

Warren County Coal Production:
1975 - 1989: No. 5 and No. 6 Coal

	Year	Total Production	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
July - Dec.	1975	---	---	---	---	---
	1976	---	---	---	---	---
	1977	---	---	---	---	---
	1978	---	---	---	---	---
	1979	---	---	---	---	---
	1980	---	---	---	---	---
	1981	---	---	---	---	---
	1982	---	---	---	---	---
	1983	---	---	---	---	---
	1984	---	---	---	---	---
	1985	---	---	---	---	---
	1986	---	---	---	---	---
	1987	---	---	---	---	---
	1988	---	---	---	---	---
	1989	---	---	---	---	---
	TOTAL	---	---	---	---	---
	Stripped Reserves	---	---	---	---	---

Production = 80% of stripped reserves

Bureau County Coal Reserve
(as of July 1, 1975)

Block Number	Coal Member	M Tons of Reserves	0 - 50	Feet of Overburden 50 - 60	50 - 75	50 - 100
4	7	6.66000	3.46320	---	3.19680	---
5	7	10.10300	5.35459	---	4.74841	---
6	7	9.48900	9.39411	0.09489	---	---
7*	7	28.83636	17.30182	---	11.53454	---
108	6	5.95600	0.71472	---	---	5.24128
109	6	18.16300	8.35498	---	---	9.80802
110	6	35.58500	12.81060	---	---	22.77440#
111	6	0.92736	0.14838	---	---	0.77898
113	6	5.09337	1.37521	---	---	3.71816
114	6	28.54368	0.57087	---	---	27.97281
TOTAL..............		149.35677	59.48848	0.09489	19.47975	70.29365#
Blocks with Obstacles..........		28.83636	17.30182	---	11.53454	---
TOTAL less Blocks with Obstacles..........		120.52041	42.18666	0.09489	7.94521	70.29365#
No. 5 and No. 6 Sub-Total.........		94.26841	23.97476	---	---	70.29365#
Blocks with Obstacles..........		---	---	---	---	---
Sub-Total less Blocks with Obstacles..........		94.26841	23.97476	---	---	70.29365#

* Highway, pipeline, railroad and/or stream runs through block or block surface area and/or block adjacent to a municipality.

Includes 355,850 tons of coal with 100 - 125 feet of overburden.

Bureau County Coal Reserves
(as of July 1, 1975)

All Coal (M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
TOTAL	149.36#	79.06	59.58	59.49
Blocks with Obstacles	28.84	28.84	17.30	17.30
Total less Blocks with Obstacles	120.52#	50.23	42.28	42.19

No. 5 and No. 6 Coal Only
(M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
TOTAL	94.27#	23.97	23.97	23.97
Blocks with Obstacles	---	---	---	---
Total less Blocks with Obstacles	94.27#	23.97	23.97	23.97

Includes 355,850 tons of coal with 100 - 125 feet of overburden.

1990 Bureau County Coal Reserves
(July 1975 Reserves less 1975 - 1989 Stripped Reserves)

All Coal (M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
1975 - 1989 Stripped Reserves	---	---	---	---
1990 Total	149.36#	79.06	59.58	59.49
1990 Total Less Blocks with Obstacles	120.52#	50.23	42.28	42.19

No. 5 and No. 6 Coal Only
(M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
1975 - 1989 Stripped Reserves	---	---	---	---
1990 Total	94.27#	23.97	23.97	23.97
1990 Total less Blocks with Obstacles	94.27#	23.97	23.97	23.97

Includes 355,850 tons of coal with 100 - 125 feet of overburden.

Fulton County Coal Reserve

(as of July 1, 1975)

Block Number	Coal Member	M Tons of Reserves	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
14	7	0.38220	0.38220	---	---	---
133	6	1.86372	0.27956	---	---	1.58416
134*	6	125.00334	32.50087	---	---	92.50247
135	6	6.88750	0.41325	---	---	6.47425
15	5	35.39932	9.91181	---	---	25.48751
37*	5	12.05700	1.68798	---	---	10.36902
38*	5	77.26200	15.45240	---	---	61.80960
39*	5	50.05200	6.50676	---	---	43.54524
40	5	21.44200	2.78746	---	---	18.65454
41	5	19.61600	0.78464	---	---	18.83136
42	5	6.31000	2.46090	---	---	3.84910
43	5	7.28600	0.51002	---	---	6.77598
45	5	6.46700	6.40233	---	---	0.06467
46	5	6.63600	6.63600	---	---	---
53	5	11.38100	11.38100	---	---	---
32	2	0.36434	0.25868	---	0.10566	---
47	2	8.98600	8.62656	---	0.35944	---
48	2	10.03400	2.30782	7.72618	---	---
49	2	12.91100	4.00241	---	8.90859	---
50*	2	34.51994	17.95037	---	16.56957	---
51	2	16.71292	7.85507	---	8.85785	---
52	2	11.97200	4.07048	---	7.90152	---
54	2	22.69900	10.89552	---	11.80348	---
55	2	52.44400	22.02648	---	30.41752	---
56*	2	14.23600	6.69092	---	7.54508	---
57	2	7.85500	3.53475	---	4.32025	---
58	2	17.51600	8.93316	---	8.58284	---
59	2	18.00816	9.54432	---	8.46384	---
60	2	21.52900	6.88928	---	14.63972	---
61	2	11.38568	6.83141	---	4.55427	---
62	2	8.05244	3.54307	---	4.50937	---
TOTAL..............		657.27056	222.05748	7.72618	137.53900	289.94790
Blocks with Obstacles..........		313.13028	80.78930	---	24.11465	208.22633
TOTAL less Blocks with Obstacles..........		344.14028	141.26818	7.72618	113.42435	81.72157
No. 5 and No. 6 Sub-Total.........		387.66288	97.71498	---	---	289.94790
Blocks with Obstacles..........		264.37434	56.14801	---	---	208.22633
Sub-Total less Blocks with Obstacles..........		123.28854	41.56697	---	---	81.72157

* Highway, pipeline, railroad and/or stream runs through block or block surface area and/or block adjacent to a municipality.

Fulton County Coal Reserves
(as of July 1, 1975)

All Coal (M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
TOTAL	657.27	367.32	229.78	222.06
Blocks with Obstacles	313.13	104.90	80.79	80.79
Total less Blocks with Obstacles	344.14	262.42	148.99	141.27

No. 5 and No. 6 Coal Only (M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
TOTAL	387.66	97.71	97.71	97.71
Blocks with Obstacles	264.37	56.15	56.15	56.15
Total less Blocks with Obstacles	123.29	41.57	41.57	41.57

1990 Fulton County Coal Reserves
(July 1975 Reserves less 1975 - 1989 Stripped Reserves)

All Coal (M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
1975 - 1989 Stripped Reserves	31.28	12.19	3.37	0.01
1990 Total	625.99	355.13	226.41	222.05
1990 Total Less Blocks with Obstacles	312.86	250.23	145.62	141.26

No. 5 and No. 6 Coal Only
(M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
1975 - 1989 Stripped Reserves	21.79	0.01	0.01	0.01
1990 Total	365.87	97.70	97.70	97.70
1990 Total less Blocks with Obstacles	101.50	41.56	41.56	41.56

Henry County Coal Reserve

(as of July 1, 1975)

Block Number	Coal Member	M Tons of Reserves	0 - 50	Feet of Overburden 50 - 60	50 - 75	50 - 100
7*	7	39.82164	23.89298	---	15.92866	---
111	6	22.25664	3.56106	---	---	18.69558
112	6	11.40900	2.62407	---	---	8.78493
113	6	4.89363	1.32128	---	---	3.57235
114	6	20.11032	0.40221	---	---	19.70811
115*	6	58.53420	6.43876	---	---	52.09544
117	6	25.48400	24.20980	1.27420	---	---
8*	2	11.99700	11.75706	---	0.23004	---
9	2	7.74500	1.54900	---	6.19600	---
TOTAL		202.25143	75.75623	1.27420	22.36460	102.85640
Blocks with Obstacles		110.35284	42.08880	---	16.16860	52.09544
TOTAL less Blocks with Obstacles		91.89860	33.66743	1.27420	6.19600	50.76097
No. 5 and No. 6 Sub-Total		142.68779	38.55718	1.27420	---	102.85640
Blocks with Obstacles		58.53420	6.43876	---	---	52.09544
Sub-Total less Blocks with Obstacles		84.15359	32.11842	1.27420	---	50.76100

* Highway, pipeline, railroad and/or stream runs through block or block surface area and/or block adjacent to a municipality.

Henry County Coal Reserves
(as of July 1, 1975)

All Coal (M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
TOTAL	202.25	99.40	77.03	75.76
Blocks with Obstacles	110.35	58.26	42.09	42.09
Total less Blocks with Obstacles	91.90	41.14	34.94	33.67

No. 5 and No. 6 Coal Only
(M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
TOTAL	142.69	39.83	39.83	38.56
Blocks with Obstacles	58.53	6.44	6.44	6.44
Total less Blocks with Obstacles	84.15	33.39	33.39	32.12

1990 Henry County Coal Reserves
(July 1975 Reserves less 1975 - 1989 Stripped Reserves)

All Coal (M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
1975 - 1989 Stripped Reserves	---	---	---	---
1990 Total	202.25	99.40	77.03	75.76
1990 Total Less Blocks with Obstacles	91.90	41.14	34.94	33.67

No. 5 and No. 6 Coal Only
(M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
1975 - 1989 Stripped Reserves	---	---	---	---
1990 Total	142.69	39.83	39.83	38.56
1990 Total less Blocks with Obstacles	84.15	33.39	33.39	32.12

Knox County Coal Reserves
(as of July 1, 1975)

Block Number	Coal Member	M Tons of Reserves	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
14	7	1.98744	1.98744	---	---	---
118	6	11.32800	10.98816	0.33984	---	---
119	6	58.34900	28.00752	---	30.34148	---
120	6	39.73400	13.90690	---	25.82710	---
121*	6	25.54500	14.30520	---	11.23980	---
122	6	7.27100	7.27100	---	---	---
132	6	6.04128	3.02064	---	---	3.02064
11*	5	58.28340	19.23352	---	---	39.04988
15	5	45.05368	12.61503	---	---	32.43865
16*	5	26.45100	14.28354	---	12.16746	---
17	5	11.14635	3.45537	---	7.69098	---
18	5	15.03600	12.93096	---	2.10504	---
19	5	6.19500	6.13305	0.06195	---	---
20	5	11.57200	11.57200	---	---	---
21*	5	9.81400	9.81400	---	---	---
22*	5	26.64500	26.64500	---	---	---
31	5	10.86300	10.86300	---	---	---
23	2	6.42528	2.89138	---	3.53390	---
26*	2	6.20313	6.14110	0.06203	---	---
29*	2	6.09840	6.03742	0.06098	---	---
30	2	8.57300	7.80143	0.77157	---	---
32	2	36.06966	25.60946	---	10.46020	---
33	2	9.04700	8.50418	---	0.54282	---
34	2	22.01800	20.91710	---	1.10090	---
35	2	25.51900	15.31140	10.20760	---	---
36	2	9.26300	3.61257	---	5.65043	---
TOTAL		500.53162	303.85837	11.50397	110.66011	74.50917
Blocks with Obstacles		159.03993	96.45978	0.12301	23.40726	39.04988
TOTAL less Blocks with Obstacles		341.49169	207.39859	11.38096	87.25285	35.45929
No. 5 and No. 6 Sub-Total		369.32771	205.04489	0.40179	89.37186	74.50917
Blocks with Obstacles		146.73840	84.28126	---	23.40726	39.04988
Sub-Total less Blocks with Obstacles		222.58931	120.76363	0.40179	65.96460	35.45929

* Highway, pipeline, railroad and/or stream runs through block or block surface area and/or block adjacent to a municipality.

Knox County Coal Reserves
(as of July 1, 1975)

All Coal (M Tons)

Feet of Overburden

	0 - 100	0 - 75	0 - 60	0 - 50
TOTAL	500.53	426.02	315.36	303.86
Blocks with Obstacles	159.04	119.99	96.58	96.46
Total less Blocks with Obstacles	341.49	306.03	218.78	207.40

No. 5 and No. 6 Coal Only
(M Tons)

Feet of Overburden

	0 - 100	0 - 75	0 - 60	0 - 50
TOTAL	369.33	294.82	205.45	205.04
Blocks with Obstacles	146.74	107.69	84.28	84.28
Total less Blocks with Obstacles	222.59	187.13	121.17	120.76

1990 Knox County Coal Reserves

(July 1975 Reserves less 1975 - 1989 Stripped Reserves)

All Coal (M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
1975 - 1989 Stripped Reserves	7.07	6.43	6.43	0.00
1990 Total	493.46	419.59	308.93	303.86
1990 Total Less Blocks with Obstacles	334.42	299.60	212.35	207.40

No. 5 and No. 6 Coal Only (M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
1975 - 1989 Stripped Reserves	7.07	6.43	0.00	0.00
1990 Total	362.26	288.39	205.45	205.04
1990 Total less Blocks with Obstacles	215.52	180.70	121.17	120.76

McDonough County Coal Reserves

(as of July 1, 1975)

Block Number	Coal Member	M Tons of Reserves	0 - 50	Feet of Overburden 50 - 60	50 - 75	50 - 100
50*	2	3.41406	1.77531	---	1.63875	---
51	2	0.34108	0.16031	---	0.18077	---
61	2	24.60776	14.76466	---	9.84310	---
62	2	3.66020	1.61049	---	2.04971	---
63	2	10.39900	9.46309	---	0.93591	---
64	2	35.88100	25.47551	10.40549	---	---
TOTAL...............		78.30310	53.24937	10.40549	14.64824	---
Blocks with Obstacles...........		3.41406	1.77531	---	1.63875	---
TOTAL less Blocks with Obstacles...........		74.88904	51.47406	10.40549	13.00949	---
No. 5 and No. 6 Sub-Total.........		---	---	---	---	---
Blocks with Obstacles..........		---	---	---	---	---
Sub-Total less Blocks with Obstacles..........		---	---	---	---	---

* Highway, pipeline, railroad and/or stream runs through block or block surface area and/or block adjacent to a municipality.

McDonough County Coal Reserves
(as of July 1, 1975)

All Coal (M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
TOTAL	78.30	78.30	63.65	53.25
Blocks with Obstacles	3.41	3.41	1.78	1.78
Total less Blocks with Obstacles	74.89	74.89	61.88	51.47

No. 5 and No. 6 Coal Only
(M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
TOTAL	---	---	---	---
Blocks with Obstacles	---	---	---	---
Total less Blocks with Obstacles	---	---	---	---

1990 McDonough County Coal Reserves
(July 1975 Reserves less 1975 - 1989 Stripped Reserves)

All Coal (M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
1975 - 1989 Stripped Reserves	4.68	4.68	2.90	1.59
1990 Total	73.62	73.62	60.75	51.66
1990 Total Less Blocks with Obstacles	70.21	70.21	58.98	49.88

No. 5 and No. 6 Coal Only
(M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
1975 - 1989 Stripped Reserves	---	---	---	---
1990 Total	---	---	---	---
1990 Total less Blocks with Obstacles	---	---	---	---

Peoria County Coal Reserves

(as of July 1, 1975)

Block Number	Coal Member	M Tons of Reserves	0 - 50	Feet of Overburden 50 - 60	50 - 75	50 - 100
10	7	22.08008	15.89766	---	6.18242	---
13	7	13.25600	13.25600	---	---	---
14	7	5.19792	5.19792	---	---	---
123*	6	205.08048	67.67656	---	---	137.40392
124	6	6.49700	5.58742	---	0.90958	---
125	6	12.37100	2.72162	---	---	9.64938
126	6	19.92600	4.58298	---	---	15.34302
127*	6	29.43900	6.47658	---	---	22.96242
128	6	12.71600	4.45060	---	---	8.26540
129	6	8.92200	2.31972	---	---	6.60228
130	6	17.48300	5.59456	---	---	11.88844
131	6	16.77200	9.39232	---	---	7.37968
132	6	31.71672	15.85836	---	---	15.85836
134*	6	1.26266	0.32829	---	---	0.93437
135	6	4.98750	0.29925	---	---	4.68825
136	6	53.18900	11.16969	---	---	42.01931
137*	6	19.50300	4.48569	---	---	15.01731
138	6	6.34900	1.26980	---	5.07920	---
139	6	10.60300	0.63618	---	---	9.96682
11*	5	135.99460	44.87822	---	---	91.11638
12	5	9.98600	1.09846	---	---	8.88754
17	5	0.58665	0.18186	---	0.40479	---
TOTAL		643.91861	223.35974	---	12.57599	407.98288
Blocks with Obstacles		391.27974	123.84534	---	---	267.43440
TOTAL less Blocks with Obstacles		252.63887	99.51440	---	12.57599	140.54848
No. 5 and No. 6 Sub-Total		603.38461	189.00816	---	6.39357	407.98288
Blocks with Obstacles		391.27974	123.84534	---	---	267.43440
Sub-Total less Blocks with Obstacles		212.10487	65.16282	---	6.39357	140.54848

* Highway, pipeline, railroad and/or stream runs through block or block surface area and/or block adjacent to a municipality.

Peoria County Coal Reserves
(as of July 1, 1975)

All Coal (M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
TOTAL	643.92	235.94	223.36	223.36
Blocks with Obstacles	391.28	123.85	123.85	123.85
Total less Blocks with Obstacles	252.64	112.09	99.51	99.51

No. 5 and No. 6 Coal Only
(M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
TOTAL	603.38	195.40	189.01	189.01
Blocks with Obstacles	391.28	123.85	123.85	123.85
Total less Blocks with Obstacles	212.10	71.56	65.16	65.16

1990 Peoria County Coal Reserves
(July 1975 Reserves less 1975 - 1989 Stripped Reserves)

All Coal (M Tons)

Feet of Overburden

	0 - 100	0 - 75	0 - 60	0 - 50
1975 - 1989 Stripped Reserves	6.90	4.42	0.00	0.00
1990 Total	637.02	231.52	223.36	223.36
1990 Total Less Blocks with Obstacles	245.74	107.67	99.51	99.51

No. 5 and No. 6 Coal Only
(M Tons)

Feet of Overburden

	0 - 100	0 - 75	0 - 60	0 - 50
1975 - 1989 Stripped Reserves	6.90	4.42	0.00	0.00
1990 Total	596.48	190.98	189.01	189.01
1990 Total less Blocks with Obstacles	205.20	67.14	65.16	65.16

Schuyler County Coal Reserves

(as of July 1, 1975)

Block Number	Coal Member	M Tons of Reserves	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
71*	5	27.92900	25.13610	---	---	2.79290
72	5	56.73400	39.14646	---	---	17.58754
59	2	19.50884	10.33969	---	9.16915	---
61	2	0.73456	0.44074	---	0.29382	---
62	2	24.88936	10.95132	---	13.93804	---
65	2	0.90870	0.87235	---	0.03635	---
66	2	33.25896	10.31028	---	22.94868	---
68	2	8.70300	8.52894	0.17406	---	---
69	2	6.88900	6.88900	---	---	---
70*	2	12.37600	7.54936	4.82664	---	---
TOTAL...............		191.93142	120.16424	5.00070	46.38604	20.38044
Blocks with Obstacles...........		40.30500	32.68546	4.82664	---	2.79290
TOTAL less Blocks with Obstacles......		151.62642	87.47878	0.17406	46.38604	17.58754
No. 5 and No. 6 Sub-Total.........		84.66300	64.28256	---	---	20.38044
Blocks with Obstacles..........		27.92900	25.13610	---	---	2.79290
Sub-Total less Blocks with Obstacles..........		56.73400	39.14646	---	---	17.58754

* Highway, pipeline, railroad and/or stream runs through block or block surface area and/or block adjacent to a municipality.

Schuyler County Coal Reserves
(as of July 1, 1975)

All Coal (M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
TOTAL	191.93	171.55	125.16	120.16
Blocks with Obstacles	40.31	37.51	37.51	32.69
Total less Blocks with Obstacles	151.63	134.04	87.65	87.48

No. 5 and No. 6 Coal Only
(M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
TOTAL	84.66	64.28	64.28	64.28
Blocks with Obstacles	27.93	25.14	25.14	25.14
Total less Blocks with Obstacles	56.73	39.15	39.15	39.15

1990 Schuyler County Coal Reserves
(July 1975 Reserves less 1975 - 1989 Stripped Reserves)

All Coal (M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
1975 - 1989 Stripped Reserves	3.87	3.87	3.87	3.87
1990 Total	188.06	167.68	121.29	116.29
1990 Total Less Blocks with Obstacles	147.76	130.17	83.78	83.61

No. 5 and No. 6 Coal Only
(M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
1975 - 1989 Stripped Reserves	---	---	---	---
1990 Total	84.66	64.28	64.28	64.28
1990 Total less Blocks with Obstacles	56.73	39.15	39.15	39.15

Stark County Coal Reserves
(as of July 1, 1975)

Block Number	Coal Member	M Tons of Reserves	Feet of Overburden			
			0 - 50	50 - 60	50 - 75	50 - 100
10	7	3.01092	2.16786	---	0.84306	---
114	6	16.21800	0.32436	---	---	15.89364
115*	6	234.13680	25.75505	---	---	208.38176
116	6	10.71000	10.71000	---	---	---
123	6	2.07152	0.70432	---	---	1.36720
TOTAL...............		266.14724	39.66159	---	0.84306	225.64260
Blocks with Obstacles...........		234.13680	25.75505	---	---	208.38176
TOTAL less Blocks with Obstacles......		32.01044	13.90654	---	0.84306	17.26084
No. 5 and No. 6 Sub-Total.........		263.13632	37.49372	---	---	225.64260
Blocks with Obstacles..........		234.13680	25.75505	---	---	208.38176
Sub-Total less Blocks with Obstacles..........		28.99952	11.73868	---	---	17.26084

* Highway, pipeline, railroad and/or stream runs through block or block surface area and/or block adjacent to a municipality.

Stark County Coal Reserves
(as of July 1, 1975)

All Coal (M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
TOTAL	266.15	40.50	39.66	39.66
Blocks with Obstacles	234.14	25.76	25.76	25.76
Total less Blocks with Obstacles	32.01	14.75	13.91	13.91

No. 5 and No. 6 Coal Only
(M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
TOTAL	263.14	37.49	37.49	37.49
Blocks with Obstacles	234.14	25.76	25.76	25.76
Total less Blocks with Obstacles	29.00	11.74	11.74	11.74

1990 Stark County Coal Reserves
(July 1975 Reserves less 1975 - 1989 Stripped Reserves)

All Coal (M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
1975 - 1989 Stripped Reserves	0.68	---	---	---
1990 Total	265.47	40.50	39.66	39.66
1990 Total Less Blocks with Obstacles	31.33	14.75	13.91	13.91

No. 5 and No. 6 Coal Only
(M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
1975 - 1989 Stripped Reserves	0.68	---	---	---
1990 Total	262.46	37.49	37.49	37.49
1990 Total less Blocks with Obstacles	28.32	11.74	11.74	11.74

Warren County Coal Reserves

(as of July 1, 1975)

Block Number	Coal Member	M Tons of Reserves	Feet of Overburden 0 - 50	50 - 60	50 - 75	50 - 100
23	2	0.19872	0.08942	---	0.10930	---
24	2	11.86500	11.74635	0.11865	---	---
25*	2	16.16800	14.55120	1.61680	---	---
26*	2	5.95987	5.90027	0.05960	---	---
27*	2	7.83200	7.44040	0.39160	---	---
28*	2	11.67200	8.98744	2.68456	---	---
29*	2	0.83160	0.82328	0.00832	---	---
TOTAL		54.52719	49.53836	4.87953	0.10930	---
Blocks with Obstacles		42.46347	37.70259	4.76088	---	---
TOTAL less Blocks with Obstacles		12.06372	11.83577	0.11865	0.10930	---
No. 5 and No. 6 Sub-Total.........		---	---	---	---	---
Blocks with Obstacles..........		---	---	---	---	---
Sub-Total less Blocks with Obstacles..........		---	---	---	---	---

* Highway, pipeline, railroad and/or stream runs through block or block surface area and/or block adjacent to a municipality.

Warren County Coal Reserves
(as of July 1, 1975)

All Coal (M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
TOTAL	54.53	54.53	54.42	49.54
Blocks with Obstacles	42.46	42.46	42.46	37.70
Total less Blocks with Obstacles	12.06	12.06	11.95	11.84

No. 5 and No. 6 Coal Only
(M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
TOTAL	---	---	---	---
Blocks with Obstacles	---	---	---	---
Total less Blocks with Obstacles	---	---	---	---

1990 Warren County Coal Reserves
(July 1975 Reserves less 1975 - 1989 Stripped Reserves)

All Coal (M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
1975 - 1989 Stripped Reserves	---	---	---	---
1990 Total	54.53	54.53	54.42	49.54
1990 Total Less Blocks with Obstacles	12.06	12.06	11.95	11.84

No. 5 and No. 6 Coal Only
(M Tons)

	Feet of Overburden			
	0 - 100	0 - 75	0 - 60	0 - 50
1975 - 1989 Stripped Reserves	---	---	---	---
1990 Total	---	---	---	---
1990 Total less Blocks with Obstacles	---	---	---	---

Total July 1975 Coal Reserves
(Million Tons of Coal)

All Coal

Feet of Overburden

County	0 - 100	0 - 75	0 - 60	0 - 50
Bureau	149.36	79.06	59.58	59.49
Fulton	657.27	367.32	229.78	222.06
Henry	202.25	99.40	77.03	75.75
Knox	500.53	426.02	315.36	303.86
McDonough	78.30	78.30	63.66	53.25
Peoria	643.92	235.94	223.36	223.36
Schuyler	191.93	171.55	125.16	120.16
Stark	266.15	40.50	39.66	39.66
Warren	54.53	54.53	54.42	49.54
TOTAL	2,744.24	1,552.62	1,188.01	1,147.13

No. 5 and No. 6 Coal Only

Feet of Overburden

County	0 - 100	0 - 75	0 - 60	0 - 50
Bureau	94.27	23.97	23.97	23.97
Fulton	387.66	97.71	97.71	97.71
Henry	142.69	39.83	39.83	38.56
Knox	369.33	294.82	205.45	205.04
McDonough	---	---	---	---
Peoria	603.38	195.40	189.01	189.01
Schuyler	84.66	64.28	64.28	64.28
Stark	263.14	37.49	37.49	37.49
Warren	---	---	---	---
TOTAL	1,945.13	753.50	657.74	656.06

Source: Colin G. Treworgy, Lawrence E. Bengal and Amy G. Dingwell, Reserves and Resources of Surface-Minable Coal in Illinois, Illinois State Geological Survey Circular 504, 1978, Appendix 2, pp. 21-33.

July 1975 Coal Reserves*
(Million Tons of Coal)

All Coal

Feet of Overburden

County	0 - 100	0 - 75	0 - 60	0 - 50
Bureau	120.52	50.23	42.28	42.19
Fulton	344.14	262.42	148.99	141.27
Henry	91.90	41.14	34.94	33.67
Knox	341.49	306.03	218.78	207.40
McDonough	74.89	74.89	61.88	51.47
Peoria	252.64	112.09	99.51	99.51
Schuyler	151.63	134.04	87.65	87.47
Stark	32.01	14.75	13.91	13.91
Warren	12.06	12.06	11.95	11.84
TOTAL	1,421.28	1,007.65	719.89	688.73

No. 5 and No. 6 Coal Only

Feet of Overburden

County	0 - 100	0 - 75	0 - 60	0 - 50
Bureau	94.27	23.97	23.97	23.97
Fulton	123.29	41.57	41.57	41.57
Henry	84.15	33.39	33.39	32.12
Knox	222.59	187.13	121.17	120.76
McDonough	---	---	---	---
Peoria	212.10	71.56	65.16	65.16
Schuyler	56.73	39.15	39.15	39.15
Stark	29.00	11.74	11.74	11.74
Warren	---	---	---	---
TOTAL	822.13	408.51	336.15	334.47

* Less reserves where a highway, pipeline, railroad and/or stream runs through block or block surface area and/or block adjacent to a municiapality.

(Total July 1975 Reserves
less July 1975 through December 1989 Stripped Reserves)

(Million Tons of Coal)

All Coal

County	Feet of Overburden 0 - 100	0 - 75	0 - 60	0 - 50
Bureau	149.36	79.06	59.58	59.49
Fulton	625.99	355.13	226.41	222.05
Henry	202.25	99.40	77.03	75.76
Knox	493.46	419.59	308.93	303.86
McDonough	73.62	73.62	60.75	51.66
Peoria	637.02	231.52	223.36	223.36
Schuyler	188.06	167.68	121.29	116.29
Stark	265.47	40.50	39.66	39.66
Warren	54.53	54.53	54.42	49.54
TOTAL	2,689.76	1,521.03	1,171.43	1,141.67

No. 5 and No. 6 Coal Only

County	Feet of Overburden 0 - 100	0 - 75	0 - 60	0 - 50
Bureau	94.27	23.97	23.97	23.97
Fulton	365.87	97.70	97.70	97.70
Henry	142.69	39.83	39.83	38.56
Knox	362.26	288.39	205.45	205.04
McDonough	---	---	---	---
Peoria	596.48	190.98	189.01	189.01
Schuyler	84.66	64.28	64.28	64.28
Stark	262.46	37.49	37.49	37.49
Warren	---	---	---	---
TOTAL	1,908.69	742.64	657.73	656.05

1990 Coal Reserves*

(July 1975 Reserves
less July 1975 through December 1989 Stripped Reserves)

(Million Tons of Coal)

All Coal

County	Feet of Overburden 0 - 100	0 - 75	0 - 60	0 - 50
Bureau	120.52	50.23	42.28	42.19
Fulton	312.86	250.23	145.62	141.26
Henry	91.90	41.14	34.94	33.67
Knox	334.42	299.60	212.35	207.40
McDonough	70.21	70.21	58.98	49.88
Peoria	245.74	107.67	99.51	99.51
Schuyler	147.76	130.17	83.78	83.61
Stark	31.33	14.75	13.91	13.91
Warren	12.06	12.06	11.95	11.84
TOTAL	1,366.80	976.06	703.32	683.27

No. 5 and No. 6 Coal Only

County	Feet of Overburden 0 - 100	0 - 75	0 - 60	0 - 50
Bureau	94.27	23.97	23.97	23.97
Fulton	101.50	41.56	41.56	41.56
Henry	84.15	33.39	33.39	32.12
Knox	215.52	180.70	121.17	120.76
McDonough	---	---	---	---
Peoria	205.20	67.14	65.16	65.16
Schuyler	56.73	39.15	39.15	39.15
Stark	28.32	11.74	11.74	11.74
Warren	---	---	---	---
TOTAL	785.69	397.65	336.14	334.46

* Less reserves where a highway, pipeline, railroad and/or stream runs through block or block surface area and/or block adjacent to a municipality.

APPENDIX H

LOCAL COAL CONSUMPTION

MONTHLY COAL CONSUMPTION OF ELECTRIC GENERATING UNITS: 1988 (TONS)

Unit	Beginning Stocks	January	February	March	April	May	June	July
CILCO								
E. D. Edwards	265,818	105,490	89,165	88,449	88,223	113,581	116,830	123,262
Duck Creek	153,414	89,804	92,057	97,639	74,301	46,287	73,857	88,207
Com Ed								
Powerton	1,387,122	88,245	102,456	194,669	178,274	134,577	296,968	221,832
Illinois Power								
Havana	109,851	32,918	46,561	66,871	69,330	53,464	45,764	35,084
Hennepin	229,696	61,304	60,572	73,761	67,639	52,177	63,388	55,441
TOTAL	2,145,901	377,761	390,811	521,389	477,767	400,086	596,807	523,826

Unit	August	September	October	November	December	Total Consumed	End Stocks	End Stock-Beginning Stock	Total Bought
CILCO									
E. D. Edwards	136,140	89,447	142,031	98,673	86,660	1,277,951	145,872	-119,946	1,158,005
Duck Creek	91,452	97,684	-0-	71,849	100,247	923,384	167,751	14,337	937,721
Com Ed									
Powerton	258,961	73,265	225,835	335,620	286,356	2,397,058	1,764,883	377,761	2,774,819
Illinois Power									
Havana	44,997	-0-	-0-	45,330	53,283	493,607	211,841	101,990	595,597
Hennepin	63,840	45,574	20,332	59,896	59,710	683,634	167,361	- 62,335	621,299
TOTAL	595,390	305,970	388,198	611,368	586,261	5,775,634	2,457,708	311,807	6,087,441

Source: Federal Power Commission (monthly).

MONTHLY COAL CONSUMPTION OF ELECTRIC GENERATING UNITS: 1989 (TONS)

Unit	Beginning Stocks	January	February	March	April	May	June	July
CILCO								
E. D. Edwards	145,872	124,109	112,170	78,204	98,260	113,658	95,426	116,704
Duck Creek	167,751	80,430	94,640	89,337	45,500	41,250	93,584	79,043
Com Ed								
Powerton	1,764,883	273,042	323,108	109,874	91,122	35,598	56,734	155,657
Illinois Power								
Havana	211,184	91,748	79,523	74,375	72,158	69,138	48,321	52,668
Hennepin	167,361	75,149	70,548	66,840	10,700	20,728	64,081	62,728
TOTAL	2,457,051	644,478	679,989	418,630	317,740	280,372	358,146	466,800

Unit	August	September	October	November	December	Total Consumed	End Stocks	End Stock-Beginning Stock	Total Bought
CILCO									
E. D. Edwards	122,828	106,969	125,934	73,189	89,877	1,247,328	160,070	14,198	1,261,526
Duck Creek	86,921	83,664	42,472	87,043	93,962	917,846	245,509	77,758	995,604
Com Ed									
Powerton	160,403	189,727	306,527	235,230	260,567	2,197,589	1,871,894	107,011	2,304,600
Illinois Power									
Havana	42,976	34,751	27,833	6,628	50,490	650,609	81,963	-129,221	521,388
Hennepin	58,044	52,226	58,461	57,525	64,685	661,715	88,454	- 78,907	582,808
TOTAL	471,172	467,337	561,227	459,615	559,581	5,675,087	2,447,890	-9,161	5,665,926

Source: Federal Power Commission (monthly).

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12. Sponsoring Organization Name and Address Illinois Department of Mines and Minerals 300 West Jefferson Street, Suite 300 P.O. Box 10197 Springfield, IL 62791-0197	13. Type of Report & Period Covered FINAL 14.

15. Supplementary Notes

Revises a previously published draft land report. The text document (RE-GI-90/12) and the Map Atlas (RE-GI-90/12 (MA)) were prepared to be used concurrently.

16. Abstract (Limit: 200 words)

This report was prepared by the Illinois Department of Energy and Natural Resources (ENR) for the Illinois Department of Mines and Minerals (DMM) under the authorization of the Illinois Surface Coal Mining Land Conservation and Reclamation Act (PA 81-1015). A petition to designate certain farmlands in Salem Township of Knox County, Illinois, unsuitable for mining was filed with DMM by local landowners and the Knox County Farm Bureau, Inc. ENR is required to prepare a land report for these petitions when they are declared complete by DMM. The land report documents the status of existing resources in the petition area and surrounding region and the impact a declaration of unsuitability would have on these resources in the future. Further, the report discusses the impact of mining on existing land use plans or programs, fragile or historic lands, renewable resource lands, the human environment, socioeconomic resources and natural hazard lands.

17. Document Analysis a. Descriptors

Surface mining, Hydrology, Archaeology
Coal mining, Geology
Land use, Soils

b. Identifiers/Open-Ended Terms

Illinois, Impacts of mining
Knox County, Geographic Information System
Salem Township
Lands Unsuitable for Mining

c. COSATI Field/Group 08I (primary) 08F (secondary)

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